



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
REGION 5  
77 WEST JACKSON BOULEVARD  
CHICAGO, IL 60604-3590

Page 1 of 17  
REPLY TO THE ATTENTION OF:  
UNDERGROUND INJECTION CONTROL CLASS III AREA PERMIT

Permit Number: MI-133-3G-A002

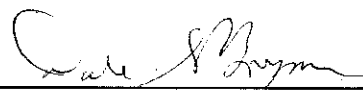
Project Name : Hersey Potash Project

Pursuant to the provisions of the Safe Drinking Water Act, as amended (42 U.S.C. 300f et seq., commonly known as the SDWA) and implementing regulations promulgated by the United States Environmental Protection Agency (USEPA) at Parts 124, 144, 146 and 147 of Title 40 of the Code of Federal Regulations (CFR), Kalium Chemicals, Ltd. of Rolling Meadows, Illinois is authorized to operate six existing and two proposed solution mining injection wells located in Michigan, Osceola County, in a permit area limited to that described in Part III(D) of this permit. Injection shall be limited to the A-1 Evaporite between 7479 and 7896 feet, upon the express condition that the permittee meet the restrictions set forth herein. The names and locations of wells authorized under this permit and a map of the permit area are provided in Part III(D) of this permit. Injection shall not commence into any newly drilled or converted well until the operator has received authorization in accordance with Part I(E)(11) of this permit. Additional injection wells may be constructed and operated within the permit area provided that the permittee notifies the Director prior to construction and all permit requirements are met.

All references to 40 Code of Federal Regulations are to all regulations that are in effect on the date that this permit is effective.

This permit shall become effective on MAY 15 1992 and shall remain in full force and effect during the operating life of the field, unless this permit is otherwise revoked, terminated, modified or reissued pursuant to 40 CFR 144.39, 144.40 and 144.41. This permit shall also remain in effect upon delegation of primary enforcement responsibility to the State of Michigan unless that State chooses to adopt this permit as a State permit. This permit will be reviewed at least every five (5) years from the effective date specified above.

Signed and dated: 4/15/1992

  
Dale S. Bryson  
Director, Water Division



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
REGION 5  
77 WEST JACKSON BOULEVARD  
CHICAGO, IL 60604-3590

Page 1 of 17  
UNDERGROUND INJECTION CONTROL MINOR PERMIT MODIFICATION: REPLY TO THE ATTENTION OF:  
CLASS III AREA PERMIT

Permit Number: MI-133-3G-A002

Project Name : Hersey Potash Project

Pursuant to the provisions of the Safe Drinking Water Act, as amended (42 U.S.C. 300f et seq., commonly known as the SDWA) and implementing regulations promulgated by the United States Environmental Protection Agency (USEPA) at Parts 124, 144, 146 and 147 of Title 40 Code of Federal Regulations (CFR), Kalium chemicals, Ltd. of Rolling Meadows, Illinois is authorized to operate eleven existing solution mining injection wells located in Michigan, Osceola County, in a permit area limited to that described in Part III(D) of this permit. Injection shall be limited to the Salina Group between 5765 and 7896 feet, upon the express condition that the permittee meet the restrictions set forth herein. The names and locations of wells authorized under this permit and a map of the permit area are provided in Part III(D) of this permit. Injection shall not commence into any newly drilled or converted well until the operator has received authorization in accordance with Part I(E)(11) of this permit. Additional injection wells may be constructed and operated within the permit area provided that the permittee notifies the Director prior to construction and all permit requirements are met.

All references to 40 Code of Federal Regulations are to all regulations that are in effect on the date that this permit is effective.

This permit is a minor permit modification of an existing area permit which was signed on April 15, 1992, and shall remain in full force and effect during the operating life of the field, unless this permit is otherwise revoked, terminated, modified or reissued pursuant to 40 CFR 144.39 or 144.40 and 144.41. This permit shall also remain in effect upon delegation of primary enforcement responsibility to the State of Michigan unless that State chooses to adopt this permit as a State permit. This permit will be reviewed at least every five (5) years from the effective date specified above.

Signed and date: December 15, 1993

Eduard P. Watter  
for Dale S. Bryson  
Director, Water Division

PART I

GENERAL PERMIT COMPLIANCE

A. EFFECT OF PERMIT

The permittee is allowed to engage in underground injection in accordance with the conditions of this permit. The underground injection activity, otherwise authorized by this permit or rule, shall not allow the movement of fluid containing any contaminant into underground sources of drinking water, if the presence of that contaminant may cause a violation of any Primary Drinking Water Regulation found in 40 CFR Part 142 or may otherwise adversely affect the health of persons. Any underground injection activity not specifically authorized in this permit or otherwise authorized by permit or rule is prohibited. Issuance of this permit does not convey property rights of any sort or any exclusive privilege; nor does it authorize any injury to persons or property, any invasion of other private rights, or any infringement of State or local law or regulations. Compliance with the terms of this permit does not constitute a defense to any action brought under Section 1431 of the Safe Drinking Water Act (SDWA), or any other law governing protection of public health or the environment.

B. PERMIT ACTIONS

This permit may be modified, revoked and reissued, or terminated for cause as specified in 40 CFR 144.39, 144.40, and 144.41. The filing of a request for a permit modification, revocation and reissuance, termination, or the notification of planned changes or anticipated noncompliance on the part of the permittee does not stay the applicability or enforceability of any permit condition.

C. SEVERABILITY

The provisions of this permit are severable, and if any provision of this permit or the application of any provision of this permit to any circumstance is held invalid, the application of such provision to other circumstances and the remainder of this permit shall not be affected thereby.

D. CONFIDENTIALITY

In accordance with 40 CFR Part 2 and Section 144.5, any information submitted to the USEPA pursuant to this permit may be claimed as confidential by the submitter. Any such claim must be asserted at the time of submission by stamping the words "confidential business information" on each page containing such information.

If no claim is made at the time of submission, USEPA may make the information available to the public without further notice. If a claim is asserted, the validity of the claim will be assessed in accordance with the procedures in 40 CFR Part 2 (Public Information). Claims of confidentiality for the following information will be denied:

- (1) The name and address of the permittee; and,
- (2) Information which deals with the existence, absence or level of contaminants in drinking water.

#### E. DUTIES AND REQUIREMENTS

1. Duty to Comply - The permittee shall comply with all conditions of this permit, except to the extent and for the duration such noncompliance is authorized by an emergency permit pursuant to 40 CFR 144.34. Any permit noncompliance constitutes a violation of the SDWA and is grounds for enforcement action, permit termination, revocation and reissuance or modification.
2. Penalties for Violations of Permit Conditions - Any person who operates these wells in violation of permit conditions is subject to civil penalties, fines, and other enforcement action under the SDWA and may be subject to such actions under the Resource Conservation and Recovery Act. Any person who willfully violates a permit condition may be subject to criminal prosecution.
3. Continuation of Expiring Permits
  - (a) Duty to Reapply. If the permittee wishes to continue an activity regulated by this permit after the expiration date of this permit, the permittee must submit a complete application for a new permit at least 180 days before this permit expires.
  - (b) Permit Extensions. The conditions of an expired permit may continue in force in accordance with 5 U.S.C. 558 (c) and 40 CFR 144.37.
  - (c) Effect. Permits continued under 5 U.S.C. 558 (c) and 40 CFR 144.37 remain fully effective and enforceable.
  - (d) Enforcement. When the permittee is not in compliance with the conditions of the expiring or expired permit the Director may choose to do any or all of the following:
    - (i) Initiate enforcement action based upon the permit which has been continued;



- (ii) Issue a notice of intent to deny the new permit. If the permit is denied, the owner or operator would then be required to cease the activities authorized by the continued permit or be subject to enforcement action for operation without a permit;
  - (iii) Issue a new permit under 40 CFR Part 124 with appropriate conditions; or
  - (iv) Take other actions authorized by Underground Injection Control regulations.
- (e) State Continuation - A USEPA permit does not continue in force beyond its expiration date under Federal law if at that time a State has primary enforcement responsibility under the SDWA. A State authorized to administer the UIC program may continue either USEPA or State-issued permits until the effective date of the new permits, if State law allows. Otherwise, the facility or activity is operating without a permit from the time of expiration of the old permit to the effective date of the State-issued new permit. Furthermore, if the State does not continue the USEPA permit upon obtaining primary enforcement responsibility, the permittee must obtain a new State permit or be authorized to inject by State rule or he will be injecting without authorization.
4. Need to Halt or Reduce Activity not a Defense - It shall not be a defense for a permittee in an enforcement action to state that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit.
5. Duty to Mitigate - The permittee shall take all reasonable steps to minimize or correct any adverse impact on the environment resulting from noncompliance with this permit.
6. Proper Operation and Maintenance - The permittee shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the permittee to achieve compliance with the conditions of this permit. Proper operation and maintenance includes effective performance, adequate funding, adequate operator staffing and training, and adequate laboratory and process controls, including appropriate quality assurance procedures. This provision requires the operation of back-up or auxiliary facilities or similar systems only when necessary to achieve compliance with the conditions of the permit.

7. Duty to Provide Information - The permittee shall furnish to the Director, within thirty (30) days, any information which the Director may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit, or to determine compliance with this permit. The permittee shall also furnish to the Director, upon request, copies of records required by this permit to be retained.
8. Inspection and Entry - The permittee shall allow the Director, or an authorized representative, upon the presentation of credentials and other documents as may be required by law to:
  - (a) Enter upon the permittee's premises where a regulated facility or activity is located or conducted, or where records are kept under the conditions of this permit;
  - (b) Have access to and copy, at reasonable times, any records that must be retained under the conditions of this permit;
  - (c) Inspect at reasonable times any facilities, equipment (including monitoring equipment), practices, or operations regulated or required under this permit; and
  - (d) Sample or monitor at reasonable times, for the purposes of assuring permit compliance or as otherwise authorized by the SDWA, any substances or parameters at any facilities, equipment or operations regulated or required under this permit.
9. Records
  - (a) The permittee shall retain records of all monitoring information, including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation, and copies of all records required by this permit, for a period of at least three (3) years from the date of the sample, measurement or report. The permittee shall also maintain records of all data required to complete this permit application and any supplemental information submitted under 40 CFR 144.27, 144.28 and 144.31. These periods may be extended by request of the Director at any time by written notice to the permittee.
  - (b) The permittee shall retain records concerning the nature and composition of all injected fluids until three (3) years after the completion of plugging and abandonment of the last operating injection well covered under this permit. Such plugging and abandonment shall be conducted in accordance with the plugging and abandonment plan, contained in Part III(B) of this permit. The owner or operator shall

continue to retain the records after the three (3) year retention period unless he delivers the records to the Regional Administrator or obtains written approval from the Regional Administrator to discard the records.

- (c) Records of monitoring information shall include:
- (i) The date, exact place, and the time of sampling or measurements;
  - (ii) The individual(s) who performed the sampling or measurements;
  - (iii) A precise description of both sampling methodology and the handling of samples;
  - (iv) The date(s) analyses were performed;
  - (v) The individual(s) who performed the analyses;
  - (vi) The analytical techniques or methods used; and,
  - (vii) The results of such analyses.

10. Notification Requirements

- (a) Planned Changes - The permittee shall notify and obtain the Director's approval at least thirty (30) days prior to any planned physical alterations or additions to the permitted facility, or changes in the injection fluids. Within ten (10) days prior to injection, an analysis of new injection fluids shall be submitted to the Director in accordance with Parts II(B) (2) and II(B) (3) of this permit.
- (b) Anticipated Noncompliance - The permittee shall give at least thirty (30) days advance notice to the Director for his/her approval of any planned changes in the permitted facility or activity which may result in noncompliance with permit requirements.
- (c) Transfer of Permits - This permit is not transferrable to any person except after notice is sent to the Director at least thirty (30) days prior to transfer and the requirements of 40 CFR §144.38 have been met. The Director may require modification or revocation of the permit to change the name of the permittee and incorporate such other requirements as may be necessary under the SDWA.

- (d) Compliance Schedules - Reports of compliance or non-compliance with, or any progress reports on, interim and final requirements contained in any compliance schedule of this permit shall be submitted to the Director no later than thirty (30) days following each schedule date.
- (e) Twenty-Four (24) Hour Reporting
  - (i) The permittee shall report to the Director any noncompliance which may endanger health or the environment. This information shall be provided orally within twenty-four (24) hour from the time the permittee becomes aware of the circumstances, and shall include the following information:
    - (a) Any monitoring or other information which indicates that any contaminant may cause an endangerment to an underground source of drinking water; or,
    - (b) Any noncompliance with a permit condition or malfunction of the injection system which may cause fluid migration into or between underground sources of drinking water.
  - (ii) A written submission shall also be provided as soon as possible but no later than five (5) days from the time the permittee becomes aware of the circumstances. The written submission shall contain a description of the noncompliance and its cause; the period of noncompliance, including exact dates and times, and if the noncompliance has not been corrected, the anticipated time it is expected to continue; and steps taken or planned to reduce, eliminate, and prevent recurrence of the noncompliance.
- (f) Other Noncompliance - All other instances of noncompliance shall also be reported by the permittee in accordance with Part I(E)(10)(e)(i) and (ii) of this permit.
- (g) Other Information - If or when the permittee becomes aware that the permittee failed to submit any relevant facts in the permit application, or submitted incorrect information in a permit application or in any report to the Director, the permittee shall promptly submit such facts or corrected information in accordance with 40 CFR 144.51 (1)(8).

- (h) Report on Permit Review - Within thirty (30) days of receipt of the final issued permit, the permittee shall report to the Director that the permittee has read and is personally familiar with all terms and conditions of this permit.
11. Commencing Injection - The permittee shall not commence injection into any newly drilled or converted well until:
- (a) Formation data and injection fluid analysis have been submitted in accordance with Part II(A) (5) and II(B) (2), respectively;
  - (b) A report on any logs and tests required under Part II(A) (4) of this permit has been submitted.
  - (c) Mechanical integrity of the well has been demonstrated in accordance with Part I(E) (19);
  - (d) Any required corrective action has been performed in accordance with Parts I(E) (18) and III(C); and,
  - (e) Construction is complete and the permittee has submitted to the Director, by certified mail with return receipt requested, a notice of completion of construction using EPA Form 7520-10, a plugging and abandonment plan, a copy of the State permit and either:
    - (i) The Director has inspected or otherwise reviewed the new injection well and finds it is in compliance with the conditions of the permit; or,
    - (ii) The permittee has not received, within thirteen (13) days of the date of the Director's receipt of the report required above, notice from the Director of his or her intent to inspect or otherwise review the new injection well, in which case prior inspection or review is waived and the permittee may commence injection.
12. Signatory Requirements - All reports or other information requested by the Director shall be signed and certified according to 40 CFR 144.32.
13. Notice of Plugging and Abandonment - The permittee shall notify the Director at least forty-five (45) working days before conversion or abandonment of any injection well covered under this permit.

14. Plugging and Abandonment. The permittee shall plug and abandon any well covered under this permit consistent with 40 CFR 146.10, as provided for in the plugging and abandonment plan contained in Part III(B) of this permit. Within sixty (60) working days after plugging a well, or at the time of the next quarterly report (whichever is shorter), the permittee shall submit a report to the Director. The report shall be certified as accurate by the person who performed the plugging operation, and shall consist of either:
  - (a) A statement that the well was plugged in accordance with the plan previously submitted to the Director; or
  - (b) If the actual plugging differed from the approved plan, a statement defining the actual plugging and explaining why the Director should approve such deviation. Any deviation from a previously approved plan which may endanger underground sources of drinking water is cause for the Director to require the operator to replug the well.
15. Inactive Wells. After cessation of injection for two (2) years the permittee shall plug and abandon a well in accordance with the plan and 40 CFR 144.52 (a) (6) unless the permittee has:
  - (a) Provided notice to the Director; and
  - (b) Described actions or procedures, which are deemed satisfactory by the Director, that the permittee will take to ensure that the well will not endanger underground sources of drinking water during the period of temporary abandonment. These actions and procedures shall include compliance with the technical requirements applicable to active injection wells unless waived, in writing, by the Director.
16. Financial Responsibility - The permittee shall maintain financial responsibility and resources to plug and abandon the underground injection wells in accordance with 40 CFR 144.52(a) (7) as provided in Attachment R of the administrative record corresponding to this permit action which is hereby incorporated by reference as if it appeared fully set forth herein. The permittee shall not substitute an alternative demonstration of financial responsibility from that which the Director has approved, unless the permittee has previously submitted evidence of that alternative demonstration to the Director and the Director has notified the permittee in writing that the alternative demonstration of financial responsibility is acceptable. The financial responsibility mechanism shall be updated periodically, upon request of the Director, except when



Financial Statement Coverage is used as the financial mechanism; this coverage must be updated on an annual basis. If additional wells are to be constructed under the conditions of this permit, the permittee shall increase the amount of financial assurance prior to beginning construction, to cover the additional cost of plugging and abandonment.

17. Insolvency

- (a) In the event of the bankruptcy of the trustee or issuing institution of the financial mechanism, or a suspension or revocation of the authority of the trustee institution to act as trustee or the institution issuing the financial mechanism to issue such an instrument, the permittee must submit an alternative demonstration of financial responsibility acceptable to the Director within sixty (60) days after such event. Failure to do so will result in the termination of this permit pursuant to 40 CFR 144.40(a)(1).
- (b) An owner or operator must also notify the Director by certified mail of the commencement of voluntary or involuntary proceedings under Title 11 (Bankruptcy), U.S. Code, naming the owner or operator as debtor, within ten (10) business days after the commencement of the proceeding. A guarantor of a corporate guarantee must make such a notification if he or she is named as debtor, as required under the terms of the guarantee.

18. Corrective Action

The permittee shall shut-in injection wells whenever the permittee or USEPA determines that operation thereof may be causing upward fluid migration through the well bore of any improperly plugged or unplugged well in the area of review and shall take such steps as the permittee can to properly plug the offending well(s). Any operation of wells which may cause upward fluid migration from an improperly plugged or unplugged well will be considered a violation of this permit. If the permittee or USEPA determines that a permitted well is not in compliance with 40 CFR 146.8, the permittee will immediately shut-in the well until such time as appropriate repairs can be effected and written approval to resume injection is given by the Director. In addition the permittee shall not commence injection under this permit until any and all corrective action has been taken in accordance with any plan contained in Part III(C) of this permit and in accordance with 40 CFR 144.55.

19. Mechanical Integrity (MI) - The permittee must establish and shall maintain mechanical integrity of any well covered under this area permit in accordance with 40 CFR 146.8. The mechanical integrity demonstration consists of two parts: Part I demonstrates no significant leaks in the casing, tubing, or packer and Part II demonstrates no significant fluid movement into an underground source of drinking water (USDW) through vertical channels adjacent to the wellbore. The permittee will be required to demonstrate both parts of the mechanical integrity demonstration in accordance with Part I(E)(19)(a) and (b) of this permit and thereafter once every sixty (60) months from the date of the last approved demonstration.
- (a) Pursuant to 40 CFR 146.8(a)(1), the permittee shall, within six (60) days of the permit's effective date, demonstrate the first part of MI for all solution mining injection wells which were not previously tested and approved by the EPA by using the standard annulus pressure test or another approved method.
  - (b) Pursuant to 40 CFR 146.8(a)(2), the permittee shall, within five (5) months of the permit's effective date, demonstrate the second part of MI for all existing wells which were not previously tested and approved by the EPA by running a noise, temperature or oxygen activation log. A descriptive report interpreting the results of such logs and tests shall be prepared by a knowledgeable log analyst and submitted to the Director. However, should the nature of the casing preclude the use of a noise, temperature or oxygen activation log, then pursuant to 40 CFR 146.8(c)(3), cementing records may be used to demonstrate the presence of adequate cement to prevent fluid migration behind the outermost casing and the wellbore.
  - (c) The permittee shall cause all gauges used in mechanical integrity demonstrations to be calibrated to an accuracy of not less than one-half percent (0.5%) of full scale. A copy of the calibration certificate shall be submitted to the Director or his/her representative at the time of demonstration.
  - (d) The permittee shall cease injection in a well if a loss of mechanical integrity occurs or is discovered during a test, or a loss of mechanical integrity as defined by 40 CFR 146.8 becomes evident during operation. Operations shall not resume until the Director gives approval to recommence.
  - (e) The permittee shall notify the Director of the loss of mechanical integrity, in accordance with the reporting procedures in Part I (E)(10)(e) and II (B)(3)(b) of this permit.
  - (f) The permittee shall report the results of a satisfactory mechanical integrity demonstration as provided in Part II (B)(3)(b) of this permit.

20. Restriction on Injected Substances. The permittee shall be restricted to the injection of those fluids listed on Page A-2 of 2. No fluids other than those from sources noted in the administrative record and approved by the Director shall be injected. The permittee shall submit, each year, a certified statement attesting to compliance with this requirement.
21. Construction, Conversion, operation and plugging abandonment within the Permit Area - The permittee may construct, operate, convert, or plug and abandon wells within the permit area, provided that all permit conditions are met and:
  - (a) The permittee notifies the Director at such times as specified in the permit, and,
  - (b) Any additional wells are:
    - (i) Described and identified by location;
    - (ii) Located within the same well field, facility site, reservoir project, or similar unit in the same State, and injecting in the same formation; and,
    - (iii) Operated by the permittee.

PART II

WELL SPECIFIC CONDITIONS FOR UNDERGROUND INJECTION CONTROL PERMITS

A. CONSTRUCTION REQUIREMENTS

1. Siting - Notwithstanding any other provision of this permit, injection wells shall inject only into a formation which is separated from any USDW by a confining zone that is free of known, open faults or fractures within the area of the review.
2. Casing and Cementing - Injection wells shall be cased and cemented to prevent the movement of fluids into or between underground sources of drinking water. The casing and cement used in the construction of the wells shall be as contained in Attachments L and M of the administrative record corresponding to this permit action which are hereby incorporated by reference as if they appeared fully set forth herein.
3. Wellhead Specifications - A female coupling and valve shall be installed on each wellhead, to be used for independent injection pressure readings.
4. Logs and Tests - Upon approval by the Director of the surface casing and cementation records for all newly drilled or converted wells covered under this permit, any logs and tests noted in Part III of this permit shall be performed, unless already provided. Prior to commencement of injection, the permittee shall submit to the Director for approval a descriptive report prepared by a knowledgeable log analyst interpreting the results of those logs and tests, along with the notice of completion required in Part I(E) (11) of this permit.
5. Formation Data - If not already provided, the permittee shall determine or calculate the following information concerning the injection formation and submit it to the Director for review and approval, prior to operation:
  - (a) Formation fluid pressure;
  - (b) Fracture pressure; and,
  - (c) Physical and chemical characteristics of the formation fluids.

6. Prohibition of Unauthorized Injection: Any underground injection, except as authorized by permit or rule issued under the UIC program, is prohibited. The construction, including drilling or conversion, of any well required to have a permit is prohibited until the permit has been issued and is effective.

B. OPERATING, MONITORING AND REPORTING REQUIREMENTS

1. Operating Requirements

Beginning on the effective date of this permit, the permittee is authorized to operate the injection wells, subject to the limitations and monitoring requirements set forth herein. Except during stimulation, injection pressure at the wellhead shall not exceed a maximum which shall be calculated so as to assure that the pressure in the injection zone during injection does not initiate new fractures or propagate existing fractures in the injection zone. In no case, shall injection pressure initiate fractures in the confining zone or cause the movement of injection or formation fluids into an underground source of drinking water. The injection pressure and injected fluid shall be limited and monitored as specified in Parts I(E) (20) and III(A) of this permit.

2. Monitoring Requirements

- (a) Samples and measurements, taken for the purpose of monitoring as required in Part II(B)(3), shall be representative of the monitored activity. Grab samples shall be used to obtain a representative sample of the fluid to be analyzed. Part III(A) of this permit describes the sampling location and required parameters for injection fluid analysis. The permittee shall identify the types of tests and methods used to generate the monitoring data. The monitoring program shall conform to the one described in Part III(A) of this permit.
- (b) Analytical Methods - Monitoring of the nature of injected fluids shall comply with applicable analytical methods cited and described in Table I of 40 CFR Section 136.3 or in Appendix III of 40 CFR Part 261 or by other methods that have been approved by the Director.
- (c) Injection Fluid Analysis - The nature of the injection fluids shall be monitored as specified in Part III(A) of this permit. An initial analysis of the injection fluid is contained in Attachment H of the administrative record corresponding to this permit action which is hereby incorporated by reference as if it appeared fully set forth herein. Whenever the injection fluid is modified

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to the extent that the analysis required by 40 CFR 146.34(a)(7)(iii) is incorrect or incomplete a new analysis shall be provided to the Director at the time of the next quarterly report. The Director may, by written notice require the permittee to sample and analyze the injection fluid at any time.

- (d) Injection Pressure and Cumulative Volume - The injection pressure shall be monitored semi-monthly and shall be reported quarterly as specified in Part III(A) of this permit. The injected and produced fluid volumes shall be monitored daily and shall be reported quarterly. All Class III wells may be monitored on a field or project basis rather than an individual well basis by manifold monitoring. Manifold monitoring may be used in cases of facilities consisting of more than one injection well, operating with a common manifold. Separate monitoring systems for each well are not required provided the owner/operator demonstrates that manifold is comparable to individual well monitoring. All gauges used in monitoring shall be calibrated according to Part I(19)(c) of this permit.
3. Reporting Requirements - Copies of the monitoring results and all other reports shall be submitted to the Director at the following address:

U.S. Environmental Protection Agency  
Region V  
77 W. Jackson Blvd.  
Chicago, Illinois 60604  
Attn: UIC Section, Enforcement Unit  
(WD-17J)

- (a) Quarterly Reports - The permittee shall submit the results of the injection fluid analyses specified in permit conditions in Part (II)(B)(2)(c) and in Attachment A, no later than the 10th day of the month following the end of the reporting period. Monitoring results shall be recorded on a form which has been signed and certified according to 40 CFR 144.32. Forms shall be submitted at the end of each quarter and shall be postmarked no later than the 10th day of the month following the reporting period. For all new wells, the first report shall be sent no later than the 10th day of the month following the quarter in which injection commences, and for existing wells, the first report shall be sent no later than the 10th day of the month following the first quarter of the final issued permit. This report shall include monthly average, maximum and minimum values for injection pressure, injected and produced volumes and also the specific gravity of the injected fluids.



- (b) Reports on Well Test, Workovers, and Plugging and Abandonment -  
The applicant shall provide the Director with the following reports and test results within sixty (60) days of completion of the activity:
- (i) Mechanical integrity tests, except tests which the well fails in which case twenty-four (24) hour reporting under Part I(10)(e) is applicable;
  - (ii) Logging or other test data;
  - (iii) Well workovers (using EPA Form 7520-12); and
  - (iv) Plugging and abandonment.

PART III

SPECIAL CONDITIONS

These special conditions include, but are not limited to plans for maintaining correct operations procedures, monitoring conditions and reporting, as required by 40 CFR Parts 144 and 146. These plans are described in detail in the permittee's application for a permit, and the permittee is required to adhere to these plans as approved by the Director, as follows:

- A. OPERATING, MONITORING AND REPORTING REQUIREMENTS (ATTACHED)
- B. PLUGGING AND ABANDONMENT PLAN (ATTACHED)
- C. CORRECTIVE ACTION PLAN (ATTACHED)
- D. PERMITTED WELLS AND MAP OF PERMIT AREA (ATTACHED)

OPERATING, MONITORING AND REPORTING REQUIREMENTS

<u>LIMITATION</u>	<u>MINIMUM MONITORING REQ.</u>	<u>MINIMUM REPORTING REQUIREMENTS</u>
<u>Characteristic</u>	<u>Freq.</u>	<u>Type</u>
*Injection Pressure	1402 psig (MAXIMUM)	semi-monthly quarterly
Cumulative Injected Volume	daily	quarterly
Cumulative Produced Volume	daily	quarterly
Specific Gravity	monthly grab	quarterly
**Chemical Composition of Injected Fluid	quarterly grab	quarterly

SAMPLING LOCATION: The sampling location shall be at each injection pump discharge before the manifold system.

\*The limitation on wellhead pressure serves to prevent confining-formation fracturing. This limitation was calculated using the following formula:  

$$[(0.8 \text{ psi/ft} - (0.433 \text{ psi/ft})(\text{specific gravity})) \times \text{depth}] - 14.7 \text{ psi}]$$
 The maximum wellhead pressure is dependent upon depth and specific gravity of the injected fluid. The Salina Group at 5765 feet was used as the depth and a specific gravity of 1.28 was used for the injected fluid.

\*\*Chemical composition analysis shall include, but not be limited to, the following: Sodium, Calcium, Barium, Magnesium, Total Iron, Chloride, Sulfate, Carbonate, Bicarbonate, Sulfide, Total Dissolved Solids, pH, Resistivity (ohm-meters @ 75°F), and Specific Gravity.

Composition of Injected Fluids

The injection fluids to the solution mining wells will consist of the following:

- low quality solutions from the solution mining operation
- fresh water from water wells and site run-off from rainfall
- recycled solution from the refinery
- boiler blow down fluid
- facility purge and flush water

**Plugging and Abandonment Cementing Data**

1. The cavity shall be depressured until the well is completely dead.
2. Tubing will be run in and a bridge plug set at a point near the top of the injection zone in the 7" casing (5765 ft).
3. The 7" casing will be cut with an explosive cutter at the base of the 9 5/8" intermediate casing (5450 ft - top of cement) and removed.
4. Tubing will be rerun and the first cement plug will be set in the 7" casing above the bridge plug from 5765 ft to 5450 ft.
5. The tubing will be pulled up through the cement and the top of the plug will be tagged to verify its location.
6. Plugging of the 9 5/8" casing will continue using 50/50 Poz cement up to within 291 feet of surface in 600 foot increments.
7. A 60 sack plug of Class A cement will then be set from 291 feet to surface. The 9 5/8" steel casing will be cut off and capped 3' below surface.

**Summary:**

Set bridge plug at 5765' in 7" casing

Cut and remove top 5450' of 7" casing

1st plug	5765-5450'	Class A	75 sacks	
2nd plug	5450-291'	50/50 Poz	1700 sacks	600' increments
3rd plug	291-0'	Class A	60 sacks	


 STATES ENVIRONMENTAL PROTECTION AGENCY  
 WASHINGTON, D.C. 20460

MI-133-3G-A002

## PLUGGING AND ABANDONMENT PLAN

Page B-2 of 3

WELL NAME &amp; NUMBER, FIELD NAME, LEASE NAME &amp; NUMBER

 Hersey Potash Facility  
 Solution Mining Wells

NAME, ADDRESS, &amp; PHONE NUMBER OF OWNER/OPERATOR

 Kalium Chemicals, Ltd.  
 Suite 100, The East Tower, 2550 Golf Rd  
 Rolling Meadows, IL 60008-4051

 Locate Well And Outline Unit On  
 Section Plat — 640 Acres

STATE

MI

COUNTY

Osceola

STATE PERMIT NUMBER

SURFACE LOCATION DESCRIPTION

LOCATE WELL IN TWO DIRECTIONS FROM NEAREST LINES OF QUARTER SECTION AND DRILLING UNIT

 Surface  
 Location \_\_\_\_\_ ft. From (N/S) \_\_\_\_\_ Line Of Quarter Section

And \_\_\_\_\_ ft. From (E/W) \_\_\_\_\_ Line Of Quarter Section

## TYPE OF AUTHORIZATION

- ☐ Individual Permit  
☐ Rule  
☒ Area Permit

 Number of Wells  
 In Area Permit 11
U.S.EPA Permit Number MI-133-3G-A002

## WELL ACTIVITY

- ☐ Class I  
☐ Hazardous  
☐ Nonhazardous  
☐ Class II  
☐ Brine Disposal  
☐ Enhanced Recovery  
☐ Hydrocarbon Storage  
☒ Class III  
☐ Class V

## CASING/TUBING/CEMENT RECORD AFTER PLUGGING AND ABANDONMENT

Size	Wt (lb/ft) TBG/CSG	Original Amount (CSG) (ft.)	CSG to be Left in Well (ft.)	Hole Size (in.)	Sacks Cement Used	Type
13 3/8"	54	900	900	17 1/2"	700	Lite/Class A
9 5/8"	40	5450	5450	12 1/4"	1700	Lite/Class A
7"	23-29	7800	2350	8 1/2"	350	Lite/Class A

## METHOD OF EMPLACEMENT OF CEMENT PLUGS

- ☐ The Balance Method  
☐ The Dump Bailer Method  
☐ The Two Plug Method  
☒ Other, Explain:

## CEMENT TO PLUG AND ABANDON DATA:

	Plug # 1	Plug # 2	Plug # 3	Plug #	Plug #	Plug #	Plug #
Size of Hole or Pipe in Which Plug Will Be Placed (inches)	7"	9 5/8"	9 5/8"				
Calculated Top of Plug (ft.)	5450	291	0				
Measured Top of Plug (ft.)							
Depth to Bottom of Plug (ft.)	5765	5450	291				
Sacks of Cement to be Used	75	1700	60				
Slurry Volume to be Used (cu. ft.)	81	2175	64				
Slurry Weight (lb./gal.)	15.6	14.5	15.6				
Type of Cement, Spacer or Other Material Used	Class A	50/50	Class A				
Type of Preflush Used	Brine	-- Poz --	--				

## DESCRIPTION OF PLUGGING PROCEDURE

Plug 2 is continuous, placed in 600 foot increments bottom to top.  
 Estimated cost/well = \$25,000

## ESTIMATED COST OF PLUGGING AND ABANDONMENT

Cement	\$	Cast Iron Bridge Plug	\$
Logging	\$	Cement Retainer	\$
Rig or Pulling Unit	\$	Miscellaneous	\$

## CERTIFICATION

I certify under the penalty of law that I have examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment. (Ref. 40 CFR 144.32)

NAME AND OFFICIAL TITLE (Please type or print)

 Don J. Purvis  
 Resident Manager

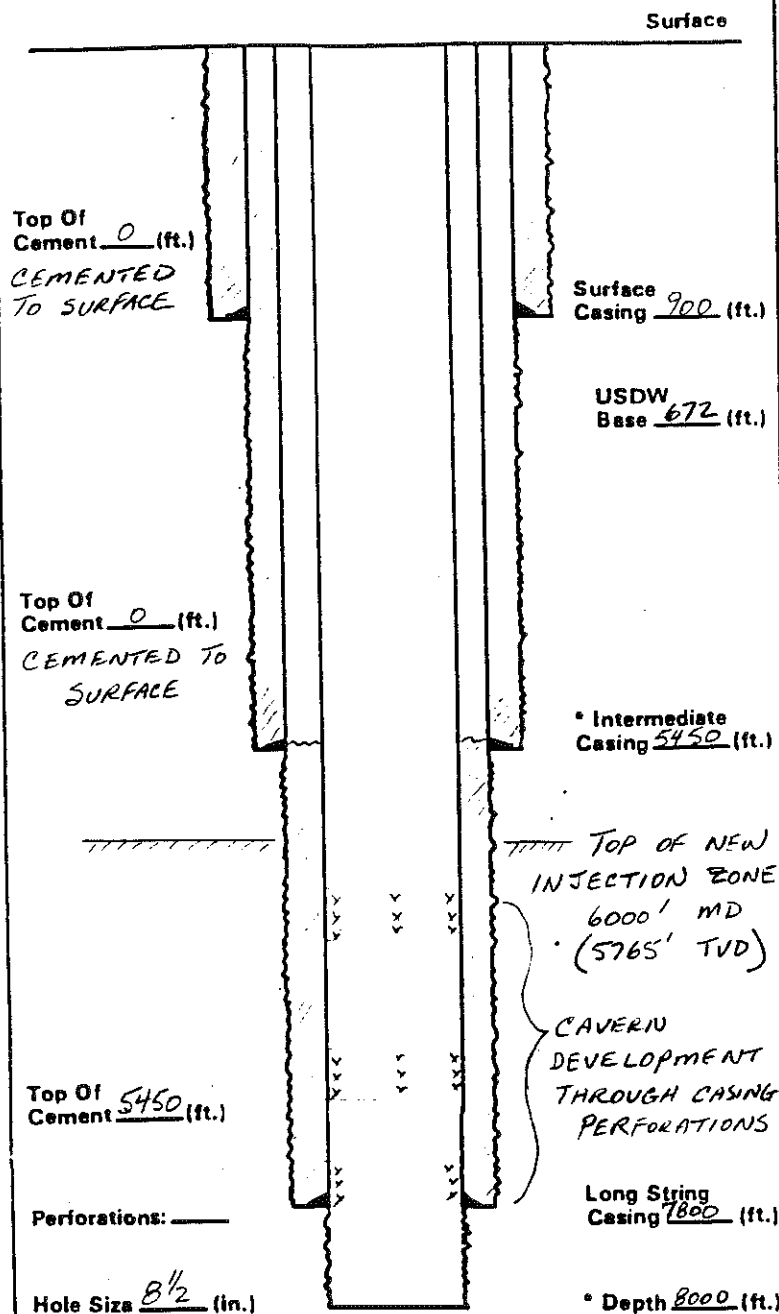
SIGNATURE

DATE SIGNED

12/6/93

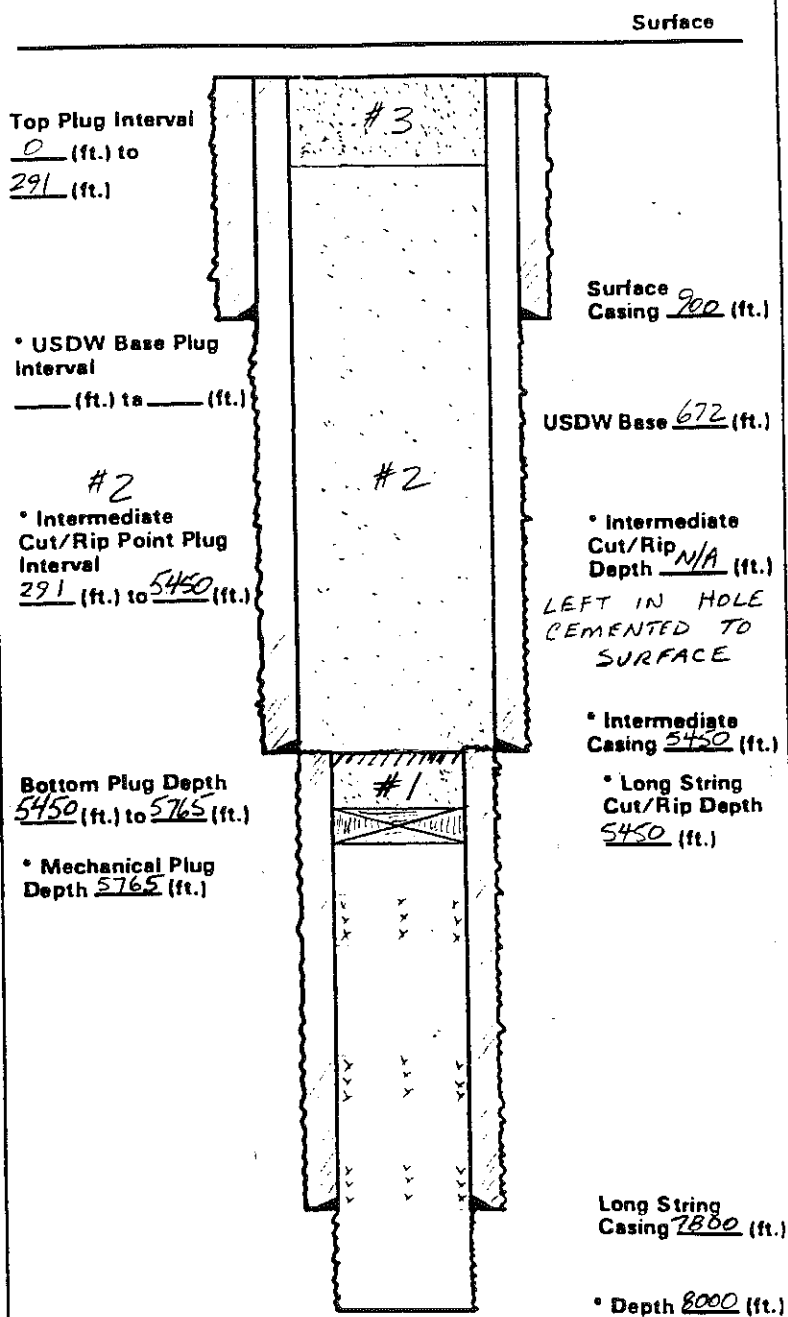


## ORIGINAL WELL CONSTRUCTION DURING OPERATION



\*\* Add Any Additional Information  
\* May Not Apply

## PLUGGING AND ABANDONMENT CONSTRUCTION



PLUG #2 IS CONTINUOUS, PLACED IN 600 FT. INCREMENTS

\*\* Add Any Additional Information  
\* May Not Apply

## LIST OF ALL OPEN AND/OR PERFORATED INTERVALS AND INTERVALS WHERE CASING WILL BE VARIED

Specify Open Hole/Perforations/Varied Casing	From	To	Formation Name

CORRECTIVE ACTION PLAN

No corrective action is required at this time

**Names and Location of Wells Authorized Under This Permit**

<b><u>Well Name</u></b>	<b><u>Surface Location</u></b>
Well #1041	SW/4-NW/4-NW/4 of Section 26-T17N-R9W
Well #1051	SW/4-NW/4-NW/4 of Section 26-T17N-R9W
Well #2031	W Line-NE/4-SW/4 of Section 26-T17N-R9W
Well #2061	N/2-SW/4 of Section 26-T17N-R9W
Well #1054	SW/4-NW/4-NW/4 of Section 26-T17N-R9W
Well #1013	SW/4-NW/4-NW/4 of Section 26-T17N-R9W
Well #1044	SW/4-NW/4-NW/4 of Section 26-T17N-R9W
Well #1031	NW/4-NW/4-SW/4 of Section 26-T17N-R9W
Well #1032	NW/4-SW/4-NW/4 of Section 26 T17N-R9W
Well #1014	NW/4-SW/4-NW/4 of Section 26-T17N-R9W
Well #2032	SE/4-NW/4-SW/4 of Section 26-T17N-R9W
Well #2062	SE/4-NW/4-SW/4 of Section 26-T17N-R9W
Well #2081	SW/4-NW/4-SE/4 of Section 26-T17N-R9W
Well #2082	SW/4-NW/4-SE/4 of Section 26-T17N-R9W
Well #2041	SW/4-NW/4-SE/4 of Section 26-T17N-R9W
Well #2042	SW/4-NW/4-SE/4 of Section 26-T17N-R9W
Well #1061	NE/4-SE/4-NE/4 of Section 26-T17N-R9W
Well #1062	NW/4-SW/4-NW/4 of Section 26-T17N-R9W
Well #1021	SW/4-NW/4-NW/4 of Section 26-T17N-R9W
Well #1022	SW/4-NW/4-NW/4 of Section 26-T17N-R9W
Well #2071	SW/4-NE/4-SW/4 of Section 26-T17N-R9W
Well #2072	SW/4-NE/4-SW/4 of Section 26-T17N-R9W

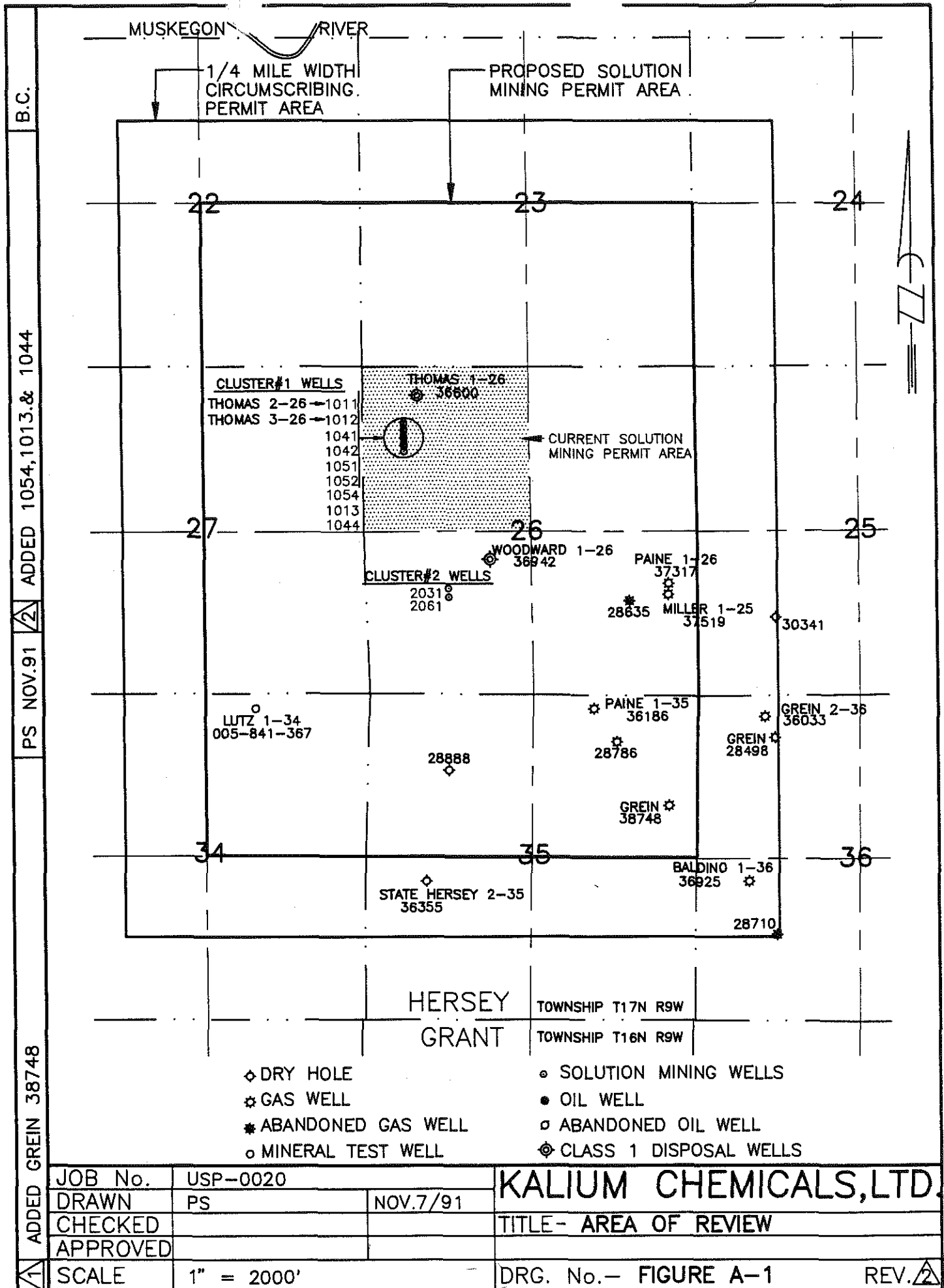
The solution mining injection wells will be limited to the following area: The SE/4 of Section 22, the S/2 of Section 23, the E/2 of Section 27, all Section 26, the NE/4 of Section 34, the N/2 of Section 35, all in Township 17N, Range 9W.

**Names and Locations of Wells Authorized Under This Permit**

<u>Well Name</u>	<u>Surface Location</u>
1. KCL 1011	SE/4-NW/4-NW/4 of section 26-T17N-R9W
2. KCL 1012	SE/4-NW/4-NW/4 of section 26-T17N-R9W
3. KCL 1041	SW/4-NW/4-NW/4 of section 26-T17N-R9W
4. KCL 1042	SW/4-NW/4-NW/4 of section 26-T17N-R9W
5. KCL 1051	SW/4-NW/4-NW/4 of section 26-T17N-R9W
6. KCL 1052	SW/4-NW/4-NW/4 of section 26-T17N-R9W
7. KCL 2031	W Line-NE/4-SW/4 of section 26-T17N-R9W
8. KCL 2061	N/2-SW/4 of section 26-T17N-R9W
9. KCL 1054	SW/4-NW/4-NW/4 of section 26-T17N-R9W
10. KCL 1013	SW/4-NW/4-NW/4 of section 26-T17N-R9W
11. KCL 1044	SW/4-NW/4-NW/4 of section 26-T17N-R9W

The solution mining injection wells will be limited to the following area:

The SE/4 of Section 22, the S/2 of Section 23, the E/2 of Section 27, all Section 26, the NE/4 of Section 34, the N/2 of Section 35, all in Township 17W, Range 9W.



B.C.  
ADDED 1054,1013.& 1044  
PS NOV.91  
ADDED GREIN 38748

JOB No.	USP-0020		KALIUM CHEMICALS,LTD.
DRAWN	PS	NOV.7/91	
CHECKED			
APPROVED			
			TITLE- AREA OF REVIEW
SCALE	1" = 2000'		DRG. No.— FIGURE A-1
			REV. 2

TITLE- AREA OF REVIEW

CLASS II  
UNDERGROUND INJECTION CONTROL PERMIT  
MINOR MODIFICATION FOR SIGNATURE

Permittee: KALIUM CHEMICALS Ltd.  
City/State: ROLLING MEADOWS, ILLINOIS

UIC Permit No: MI-133-3G-A002  
County: OSCEOLA  
Well: HERSEY POTASH PROJECT

A. Changes made to the Permit

Pages	Change(s) Made
1. <u>10F17</u>	<u>CHANGE A-1 EVAPORITE FROM 7479'-7896' TO SALINA GROUP FROM 5765'-7896'</u>
2. <u>A-10E2</u>	<u>CHANGE MAXIMUM INJECTION PRESSURE FROM 1823 PSIG TO 1402 PSIG</u>
3. <u>ATTACHMENT B</u>	<u>REPLACE EXISTING PSA PLAN WITH NEW PSA PLAN</u>
4. _____	_____

B. Final Permit Concurrence

1. Permit Writer <u>PATRICK SAIEH</u>	Date: <u>12/14/93</u>
2. Permit Team Leader <u>DUP</u>	Date: <u>12/14/93</u>
3. <del>Enforcement Coordinator</del> <u>JKM</u>	Date: <u>12/14/93</u>
4. Permit Unit Chief <u>Robert J. Hawley</u>	Date: <u>12/14/93</u>
5. UIC Section Chief <u>SAL R.H.</u>	Date: <u>12/14/93</u>
6. SDW Branch Chief <u>_____</u>	Date: _____
7. UIC-Permit Administrator <u>_____</u>	Date: _____
8. Water Div. Director <u>_____</u>	Date: <u>12/15</u>
9. UIC-Permit Administrator <u>_____</u>	Date: _____

\*\*\*\*\*

Tracking Data:

Financial Assurance: FINANCIAL STATEMENT COVERAGE Amount: N/A  
Injection Pressure: 1402 PSIG Volume: 17,857 BBL/DAY  
Specific Gravity: 1.28 Depth: 5765'  
Fracture Gradient (If over 0.8): 0.8  
Remedial Action Plan Due Date: 1 N/A

Comments:

\*\*\*\*\*

Action required

\* Water Div. Director: Please sign both original cover pages  
(two provided)

UIC: Form Letter \_\_\_\_\_ Typing/Hold File? \_\_\_\_\_

Mail Co. \_\_\_\_\_ cc DNR w/c \_\_\_\_\_ cc Cadmus \_\_\_\_\_

Rec. Green Card \_\_\_\_\_



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION 5

77 WEST JACKSON BOULEVARD

CHICAGO, IL 60604-3590

Page 1 of 17

REPLY TO THE ATTENTION OF:

UNDERGROUND INJECTION CONTROL CLASS III AREA PERMIT

Permit Number: MI-133-3G-A002

Project Name : Hersey Potash Project

Pursuant to the provisions of the Safe Drinking Water Act, as amended (42 U.S.C. 300f et seq., commonly known as the SDWA) and implementing regulations promulgated by the United States Environmental Protection Agency (USEPA) at Parts 124, 144, 146 and 147 of Title 40 of the Code of Federal Regulations (CFR), Kalium Chemicals, Ltd. of Rolling Meadows, Illinois is authorized to operate six existing and two proposed solution mining injection wells located in Michigan, Osceola County, in a permit area limited to that described in Part III(D) of this permit. Injection shall be limited to the A-1 Evaporite between 7479 and 7896 feet, upon the express condition that the permittee meet the restrictions set forth herein. The names and locations of wells authorized under this permit and a map of the permit area are provided in Part III(D) of this permit. Injection shall not commence into any newly drilled or converted well until the operator has received authorization in accordance with Part I(E)(11) of this permit. Additional injection wells may be constructed and operated within the permit area provided that the permittee notifies the Director prior to construction and all permit requirements are met.

All references to 40 Code of Federal Regulations are to all regulations that are in effect on the date that this permit is effective.

This permit shall become effective on MAY 15 1992 and shall remain in full force and effect during the operating life of the field, unless this permit is otherwise revoked, terminated, modified or reissued pursuant to 40 CFR 144.39, 144.40 and 144.41. This permit shall also remain in effect upon delegation of primary enforcement responsibility to the State of Michigan unless that State chooses to adopt this permit as a State permit. This permit will be reviewed at least every five (5) years from the effective date specified above.

Signed and dated: 4/15/1992

Dale S. Bryson  
Dale S. Bryson  
Director, Water Division

PART I

GENERAL PERMIT COMPLIANCE

A. EFFECT OF PERMIT

The permittee is allowed to engage in underground injection in accordance with the conditions of this permit. The underground injection activity, otherwise authorized by this permit or rule, shall not allow the movement of fluid containing any contaminant into underground sources of drinking water, if the presence of that contaminant may cause a violation of any Primary Drinking Water Regulation found in 40 CFR Part 142 or may otherwise adversely affect the health of persons. Any underground injection activity not specifically authorized in this permit or otherwise authorized by permit or rule is prohibited. Issuance of this permit does not convey property rights of any sort or any exclusive privilege; nor does it authorize any injury to persons or property, any invasion of other private rights, or any infringement of State or local law or regulations. Compliance with the terms of this permit does not constitute a defense to any action brought under Section 1431 of the Safe Drinking Water Act (SDWA), or any other law governing protection of public health or the environment.

B. PERMIT ACTIONS

This permit may be modified, revoked and reissued, or terminated for cause as specified in 40 CFR 144.39, 144.40, and 144.41. The filing of a request for a permit modification, revocation and reissuance, termination, or the notification of planned changes or anticipated noncompliance on the part of the permittee does not stay the applicability or enforceability of any permit condition.

C. SEVERABILITY

The provisions of this permit are severable, and if any provision of this permit or the application of any provision of this permit to any circumstance is held invalid, the application of such provision to other circumstances and the remainder of this permit shall not be affected thereby.

D. CONFIDENTIALITY

In accordance with 40 CFR Part 2 and Section 144.5, any information submitted to the USEPA pursuant to this permit may be claimed as confidential by the submitter. Any such claim must be asserted at the time of submission by stamping the words "confidential business information" on each page containing such information.



If no claim is made at the time of submission, USEPA may make the information available to the public without further notice. If a claim is asserted, the validity of the claim will be assessed in accordance with the procedures in 40 CFR Part 2 (Public Information). Claims of confidentiality for the following information will be denied:

- (1) The name and address of the permittee; and,
- (2) Information which deals with the existence, absence or level of contaminants in drinking water.

E. DUTIES AND REQUIREMENTS

1. Duty to Comply - The permittee shall comply with all conditions of this permit, except to the extent and for the duration such noncompliance is authorized by an emergency permit pursuant to 40 CFR 144.34. Any permit noncompliance constitutes a violation of the SDWA and is grounds for enforcement action, permit termination, revocation and reissuance or modification.
2. Penalties for Violations of Permit Conditions - Any person who operates these wells in violation of permit conditions is subject to civil penalties, fines, and other enforcement action under the SDWA and may be subject to such actions under the Resource Conservation and Recovery Act. Any person who willfully violates a permit condition may be subject to criminal prosecution.
3. Continuation of Expiring Permits
  - (a) Duty to Reapply. If the permittee wishes to continue an activity regulated by this permit after the expiration date of this permit, the permittee must submit a complete application for a new permit at least 180 days before this permit expires.
  - (b) Permit Extensions. The conditions of an expired permit may continue in force in accordance with 5 U.S.C. 558 (c) and 40 CFR 144.37.
  - (c) Effect. Permits continued under 5 U.S.C. 558 (c) and 40 CFR 144.37 remain fully effective and enforceable.
  - (d) Enforcement. When the permittee is not in compliance with the conditions of the expiring or expired permit the Director may choose to do any or all of the following:
    - (i) Initiate enforcement action based upon the permit which has been continued;

- (ii) Issue a notice of intent to deny the new permit. If the permit is denied, the owner or operator would then be required to cease the activities authorized by the continued permit or be subject to enforcement action for operation without a permit;
  - (iii) Issue a new permit under 40 CFR Part 124 with appropriate conditions; or
  - (iv) Take other actions authorized by Underground Injection Control regulations.
- (e) State Continuation - A USEPA permit does not continue in force beyond its expiration date under Federal law if at that time a State has primary enforcement responsibility under the SDWA. A State authorized to administer the UIC program may continue either USEPA or State-issued permits until the effective date of the new permits, if State law allows. Otherwise, the facility or activity is operating without a permit from the time of expiration of the old permit to the effective date of the State-issued new permit. Furthermore, if the State does not continue the USEPA permit upon obtaining primary enforcement responsibility, the permittee must obtain a new State permit or be authorized to inject by State rule or he will be injecting without authorization.
4. Need to Halt or Reduce Activity not a Defense - It shall not be a defense for a permittee in an enforcement action to state that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit.
5. Duty to Mitigate - The permittee shall take all reasonable steps to minimize or correct any adverse impact on the environment resulting from noncompliance with this permit.
6. Proper Operation and Maintenance - The permittee shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the permittee to achieve compliance with the conditions of this permit. Proper operation and maintenance includes effective performance, adequate funding, adequate operator staffing and training, and adequate laboratory and process controls, including appropriate quality assurance procedures. This provision requires the operation of back-up or auxiliary facilities or similar systems only when necessary to achieve compliance with the conditions of the permit.

7. Duty to Provide Information - The permittee shall furnish to the Director, within thirty (30) days, any information which the Director may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit, or to determine compliance with this permit. The permittee shall also furnish to the Director, upon request, copies of records required by this permit to be retained.
8. Inspection and Entry - The permittee shall allow the Director, or an authorized representative, upon the presentation of credentials and other documents as may be required by law to:
  - (a) Enter upon the permittee's premises where a regulated facility or activity is located or conducted, or where records are kept under the conditions of this permit;
  - (b) Have access to and copy, at reasonable times, any records that must be retained under the conditions of this permit;
  - (c) Inspect at reasonable times any facilities, equipment (including monitoring equipment), practices, or operations regulated or required under this permit; and
  - (d) Sample or monitor at reasonable times, for the purposes of assuring permit compliance or as otherwise authorized by the SDWA, any substances or parameters at any facilities, equipment or operations regulated or required under this permit.
9. Records
  - (a) The permittee shall retain records of all monitoring information, including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation, and copies of all records required by this permit, for a period of at least three (3) years from the date of the sample, measurement or report. The permittee shall also maintain records of all data required to complete this permit application and any supplemental information submitted under 40 CFR 144.27, 144.28 and 144.31. These periods may be extended by request of the Director at any time by written notice to the permittee.
  - (b) The permittee shall retain records concerning the nature and composition of all injected fluids until three (3) years after the completion of plugging and abandonment of the last operating injection well covered under this permit. Such plugging and abandonment shall be conducted in accordance with the plugging and abandonment plan, contained in Part III(B) of this permit. The owner or operator shall

continue to retain the records after the three (3) year retention period unless he delivers the records to the Regional Administrator or obtains written approval from the Regional Administrator to discard the records.

- (c) Records of monitoring information shall include:
- (i) The date, exact place, and the time of sampling or measurements;
  - (ii) The individual(s) who performed the sampling or measurements;
  - (iii) A precise description of both sampling methodology and the handling of samples;
  - (iv) The date(s) analyses were performed;
  - (v) The individual(s) who performed the analyses;
  - (vi) The analytical techniques or methods used; and,
  - (vii) The results of such analyses.

10. Notification Requirements

- (a) Planned Changes - The permittee shall notify and obtain the Director's approval at least thirty (30) days prior to any planned physical alterations or additions to the permitted facility, or changes in the injection fluids. Within ten (10) days prior to injection, an analysis of new injection fluids shall be submitted to the Director in accordance with Parts II(B) (2) and II(B) (3) of this permit.
- (b) Anticipated Noncompliance - The permittee shall give at least thirty (30) days advance notice to the Director for his/her approval of any planned changes in the permitted facility or activity which may result in noncompliance with permit requirements.
- (c) Transfer of Permits - This permit is not transferrable to any person except after notice is sent to the Director at least thirty (30) days prior to transfer and the requirements of 40 CFR §144.38 have been met. The Director may require modification or revocation of the permit to change the name of the permittee and incorporate such other requirements as may be necessary under the SDWA.

- (d) Compliance Schedules - Reports of compliance or non-compliance with, or any progress reports on, interim and final requirements contained in any compliance schedule of this permit shall be submitted to the Director no later than thirty (30) days following each schedule date.
- (e) Twenty-Four (24) Hour Reporting
  - (i) The permittee shall report to the Director any noncompliance which may endanger health or the environment. This information shall be provided orally within twenty-four (24) hour from the time the permittee becomes aware of the circumstances, and shall include the following information:
    - (a) Any monitoring or other information which indicates that any contaminant may cause an endangerment to an underground source of drinking water; or,
    - (b) Any noncompliance with a permit condition or malfunction of the injection system which may cause fluid migration into or between underground sources of drinking water.
  - (ii) A written submission shall also be provided as soon as possible but no later than five (5) days from the time the permittee becomes aware of the circumstances. The written submission shall contain a description of the noncompliance and its cause; the period of noncompliance, including exact dates and times, and if the noncompliance has not been corrected, the anticipated time it is expected to continue; and steps taken or planned to reduce, eliminate, and prevent recurrence of the noncompliance.
- (f) Other Noncompliance - All other instances of noncompliance shall also be reported by the permittee in accordance with Part I(E)(10)(e)(i) and (ii) of this permit.
- (g) Other Information - If or when the permittee becomes aware that the permittee failed to submit any relevant facts in the permit application, or submitted incorrect information in a permit application or in any report to the Director, the permittee shall promptly submit such facts or corrected information in accordance with 40 CFR 144.51 (1) (8).

- (h) Report on Permit Review - Within thirty (30) days of receipt of the final issued permit, the permittee shall report to the Director that the permittee has read and is personally familiar with all terms and conditions of this permit.
11. Commencing Injection - The permittee shall not commence injection into any newly drilled or converted well until:
- (a) Formation data and injection fluid analysis have been submitted in accordance with Part II(A)(5) and II(B)(2), respectively;
  - (b) A report on any logs and tests required under Part II(A)(4) of this permit has been submitted.
  - (c) Mechanical integrity of the well has been demonstrated in accordance with Part I(E)(19);
  - (d) Any required corrective action has been performed in accordance with Parts I(E)(18) and III(C); and,
  - (e) Construction is complete and the permittee has submitted to the Director, by certified mail with return receipt requested, a notice of completion of construction using EPA Form 7520-10, a plugging and abandonment plan, a copy of the State permit and either:
    - (i) The Director has inspected or otherwise reviewed the new injection well and finds it is in compliance with the conditions of the permit; or,
    - (ii) The permittee has not received, within thirteen (13) days of the date of the Director's receipt of the report required above, notice from the Director of his or her intent to inspect or otherwise review the new injection well, in which case prior inspection or review is waived and the permittee may commence injection.
12. Signatory Requirements - All reports or other information requested by the Director shall be signed and certified according to 40 CFR 144.32.
13. Notice of Plugging and Abandonment - The permittee shall notify the Director at least forty-five (45) working days before conversion or abandonment of any injection well covered under this permit.

14. Plugging and Abandonment. The permittee shall plug and abandon any well covered under this permit consistent with 40 CFR 146.10, as provided for in the plugging and abandonment plan contained in Part III(B) of this permit. Within sixty (60) working days after plugging a well, or at the time of the next quarterly report (whichever is shorter), the permittee shall submit a report to the Director. The report shall be certified as accurate by the person who performed the plugging operation, and shall consist of either:
  - (a) A statement that the well was plugged in accordance with the plan previously submitted to the Director; or
  - (b) If the actual plugging differed from the approved plan, a statement defining the actual plugging and explaining why the Director should approve such deviation. Any deviation from a previously approved plan which may endanger underground sources of drinking water is cause for the Director to require the operator to replug the well.
15. Inactive Wells. After cessation of injection for two (2) years the permittee shall plug and abandon a well in accordance with the plan and 40 CFR 144.52 (a) (6) unless the permittee has:
  - (a) Provided notice to the Director; and
  - (b) Described actions or procedures, which are deemed satisfactory by the Director, that the permittee will take to ensure that the well will not endanger underground sources of drinking water during the period of temporary abandonment. These actions and procedures shall include compliance with the technical requirements applicable to active injection wells unless waived, in writing, by the Director.
16. Financial Responsibility - The permittee shall maintain financial responsibility and resources to plug and abandon the underground injection wells in accordance with 40 CFR 144.52(a) (7) as provided in Attachment R of the administrative record corresponding to this permit action which is hereby incorporated by reference as if it appeared fully set forth herein. The permittee shall not substitute an alternative demonstration of financial responsibility from that which the Director has approved, unless the permittee has previously submitted evidence of that alternative demonstration to the Director and the Director has notified the permittee in writing that the alternative demonstration of financial responsibility is acceptable. The financial responsibility mechanism shall be updated periodically, upon request of the Director, except when

Financial Statement Coverage is used as the financial mechanism; this coverage must be updated on an annual basis. If additional wells are to be constructed under the conditions of this permit, the permittee shall increase the amount of financial assurance prior to beginning construction, to cover the additional cost of plugging and abandonment.

17. Insolvency

- (a) In the event of the bankruptcy of the trustee or issuing institution of the financial mechanism, or a suspension or revocation of the authority of the trustee institution to act as trustee or the institution issuing the financial mechanism to issue such an instrument, the permittee must submit an alternative demonstration of financial responsibility acceptable to the Director within sixty (60) days after such event. Failure to do so will result in the termination of this permit pursuant to 40 CFR 144.40(a) (1).
- (b) An owner or operator must also notify the Director by certified mail of the commencement of voluntary or involuntary proceedings under Title 11 (Bankruptcy), U.S. Code, naming the owner or operator as debtor, within ten (10) business days after the commencement of the proceeding. A guarantor of a corporate guarantee must make such a notification if he or she is named as debtor, as required under the terms of the guarantee.

18. Corrective Action

The permittee shall shut-in injection wells whenever the permittee or USEPA determines that operation thereof may be causing upward fluid migration through the well bore of any improperly plugged or unplugged well in the area of review and shall take such steps as the permittee can to properly plug the offending well(s). Any operation of wells which may cause upward fluid migration from an improperly plugged or unplugged well will be considered a violation of this permit. If the permittee or USEPA determines that a permitted well is not in compliance with 40 CFR 146.8, the permittee will immediately shut-in the well until such time as appropriate repairs can be effected and written approval to resume injection is given by the Director. In addition the permittee shall not commence injection under this permit until any and all corrective action has been taken in accordance with any plan contained in Part III(C) of this permit and in accordance with 40 CFR 144.55.



19. Mechanical Integrity (MI) - The permittee must establish and shall maintain mechanical integrity of any well covered under this area permit in accordance with 40 CFR 146.8. The mechanical integrity demonstration consists of two parts: Part I demonstrates no significant leaks in the casing, tubing, or packer and Part II demonstrates no significant fluid movement into an underground source of drinking water (USDW) through vertical channels adjacent to the wellbore. The permittee will be required to demonstrate both parts of the mechanical integrity demonstration in accordance with Part I(E)(19)(a) and (b) of this permit and thereafter once every sixty (60) months from the date of the last approved demonstration.
- (a) Pursuant to 40 CFR 146.8(a)(1), the permittee shall, within six (60) days of the permit's effective date, demonstrate the first part of MI for all solution mining injection wells which were not previously tested and approved by the EPA by using the standard annulus pressure test or another approved method.
  - (b) Pursuant to 40 CFR 146.8(a)(2), the permittee shall, within five (5) months of the permit's effective date, demonstrate the second part of MI for all existing wells which were not previously tested and approved by the EPA by running a noise, temperature or oxygen activation log. A descriptive report interpreting the results of such logs and tests shall be prepared by a knowledgeable log analyst and submitted to the Director. However, should the nature of the casing preclude the use of a noise, temperature or oxygen activation log, then pursuant to 40 CFR 146.8(c)(3), cementing records may be used to demonstrate the presence of adequate cement to prevent fluid migration behind the outermost casing and the wellbore.
  - (c) The permittee shall cause all gauges used in mechanical integrity demonstrations to be calibrated to an accuracy of not less than one-half percent (0.5%) of full scale. A copy of the calibration certificate shall be submitted to the Director or his/her representative at the time of demonstration.
  - (d) The permittee shall cease injection in a well if a loss of mechanical integrity occurs or is discovered during a test, or a loss of mechanical integrity as defined by 40 CFR 146.8 becomes evident during operation. Operations shall not resume until the Director gives approval to recommence.
  - (e) The permittee shall notify the Director of the loss of mechanical integrity, in accordance with the reporting procedures in Part I (E)(10)(e) and II (B)(3)(b) of this permit.
  - (f) The permittee shall report the results of a satisfactory mechanical integrity demonstration as provided in Part II (B)(3)(b) of this permit.

20. Restriction on Injected Substances. The permittee shall be restricted to the injection of those fluids listed on Page A-2 of 2. No fluids other than those from sources noted in the administrative record and approved by the Director shall be injected. The permittee shall submit, each year, a certified statement attesting to compliance with this requirement.
21. Construction, Conversion, operation and plugging abandonment within the Permit Area - The permittee may construct, operate, convert, or plug and abandon wells within the permit area, provided that all permit conditions are met and:
  - (a) The permittee notifies the Director at such times as specified in the permit, and,
  - (b) Any additional wells are:
    - (i) Described and identified by location;
    - (ii) Located within the same well field, facility site, reservoir project, or similar unit in the same State, and injecting in the same formation; and,
    - (iii) Operated by the permittee.

PART II

WELL SPECIFIC CONDITIONS FOR UNDERGROUND INJECTION CONTROL PERMITS

A. CONSTRUCTION REQUIREMENTS

1. Siting - Notwithstanding any other provision of this permit, injection wells shall inject only into a formation which is separated from any USDW by a confining zone that is free of known, open faults or fractures within the area of the review.
2. Casing and Cementing - Injection wells shall be cased and cemented to prevent the movement of fluids into or between underground sources of drinking water. The casing and cement used in the construction of the wells shall be as contained in Attachments L and M of the administrative record corresponding to this permit action which are hereby incorporated by reference as if they appeared fully set forth herein.
3. Wellhead Specifications - A female coupling and valve shall be installed on each wellhead, to be used for independent injection pressure readings.
4. Logs and Tests - Upon approval by the Director of the surface casing and cementation records for all newly drilled or converted wells covered under this permit, any logs and tests noted in Part III of this permit shall be performed, unless already provided. Prior to commencement of injection, the permittee shall submit to the Director for approval a descriptive report prepared by a knowledgeable log analyst interpreting the results of those logs and tests, along with the notice of completion required in Part I(E) (11) of this permit.
5. Formation Data - If not already provided, the permittee shall determine or calculate the following information concerning the injection formation and submit it to the Director for review and approval, prior to operation:
  - (a) Formation fluid pressure;
  - (b) Fracture pressure; and,
  - (c) Physical and chemical characteristics of the formation fluids.

6. Prohibition of Unauthorized Injection: Any underground injection, except as authorized by permit or rule issued under the UIC program, is prohibited. The construction, including drilling or conversion, of any well required to have a permit is prohibited until the permit has been issued and is effective.

B. OPERATING, MONITORING AND REPORTING REQUIREMENTS

1. Operating Requirements

Beginning on the effective date of this permit, the permittee is authorized to operate the injection wells, subject to the limitations and monitoring requirements set forth herein. Except during stimulation, injection pressure at the wellhead shall not exceed a maximum which shall be calculated so as to assure that the pressure in the injection zone during injection does not initiate new fractures or propagate existing fractures in the injection zone. In no case, shall injection pressure initiate fractures in the confining zone or cause the movement of injection or formation fluids into an underground source of drinking water. The injection pressure and injected fluid shall be limited and monitored as specified in Parts I(E) (20) and III(A) of this permit.

2. Monitoring Requirements

- (a) Samples and measurements, taken for the purpose of monitoring as required in Part II(B) (3), shall be representative of the monitored activity. Grab samples shall be used to obtain a representative sample of the fluid to be analyzed. Part III(A) of this permit describes the sampling location and required parameters for injection fluid analysis. The permittee shall identify the types of tests and methods used to generate the monitoring data. The monitoring program shall conform to the one described in Part III(A) of this permit.
- (b) Analytical Methods - Monitoring of the nature of injected fluids shall comply with applicable analytical methods cited and described in Table I of 40 CFR Section 136.3 or in Appendix III of 40 CFR Part 261 or by other methods that have been approved by the Director.
- (c) Injection Fluid Analysis - The nature of the injection fluids shall be monitored as specified in Part III(A) of this permit. An initial analysis of the injection fluid is contained in Attachment H of the administrative record corresponding to this permit action which is hereby incorporated by reference as if it appeared fully set forth herein. Whenever the injection fluid is modified

-15-

to the extent that the analysis required by 40 CFR 146.34(a)(7)(iii) is incorrect or incomplete a new analysis shall be provided to the Director at the time of the next quarterly report. The Director may, by written notice require the permittee to sample and analyze the injection fluid at any time.

- (d) Injection Pressure and Cumulative Volume - The injection pressure shall be monitored semi-monthly and shall be reported quarterly as specified in Part III(A) of this permit. The injected and produced fluid volumes shall be monitored daily and shall be reported quarterly. All Class III wells may be monitored on a field or project basis rather than an individual well basis by manifold monitoring. Manifold monitoring may be used in cases of facilities consisting of more than one injection well, operating with a common manifold. Separate monitoring systems for each well are not required provided the owner/operator demonstrates that manifold is comparable to individual well monitoring. All gauges used in monitoring shall be calibrated according to Part I(19)(c) of this permit.
3. Reporting Requirements - Copies of the monitoring results and all other reports shall be submitted to the Director at the following address:
- U.S. Environmental Protection Agency  
Region V  
77 W. Jackson Blvd.  
Chicago, Illinois 60604  
Attn: UIC Section, Enforcement Unit  
(WD-17J)
- (a) Quarterly Reports - The permittee shall submit the results of the injection fluid analyses specified in permit conditions in Part (II)(B)(2)(c) and in Attachment A, no later than the 10th day of the month following the end of the reporting period. Monitoring results shall be recorded on a form which has been signed and certified according to 40 CFR 144.32. Forms shall be submitted at the end of each quarter and shall be postmarked no later than the 10th day of the month following the reporting period. For all new wells, the first report shall be sent no later than the 10th day of the month following the quarter in which injection commences, and for existing wells, the first report shall be sent no later than the 10th day of the month following the first quarter of the final issued permit. This report shall include monthly average, maximum and minimum values for injection pressure, injected and produced volumes and also the specific gravity of the injected fluids.

- (b) Reports on Well Test, Workovers, and Plugging and Abandonment - The applicant shall provide the Director with the following reports and test results within sixty (60) days of completion of the activity:
- (i) Mechanical integrity tests, except tests which the well fails in which case twenty-four (24) hour reporting under Part I(10)(e) is applicable;
  - (ii) Logging or other test data;
  - (iii) Well workovers (using EPA Form 7520-12); and
  - (iv) Plugging and abandonment.

PART III

SPECIAL CONDITIONS

These special conditions include, but are not limited to plans for maintaining correct operations procedures, monitoring conditions and reporting, as required by 40 CFR Parts 144 and 146. These plans are described in detail in the permittee's application for a permit, and the permittee is required to adhere to these plans as approved by the Director, as follows:

- A. OPERATING, MONITORING AND REPORTING REQUIREMENTS (ATTACHED)
- B. PLUGGING AND ABANDONMENT PLAN (ATTACHED)
- C. CORRECTIVE ACTION PLAN (ATTACHED)
- D. PERMITTED WELLS AND MAP OF PERMIT AREA (ATTACHED)

OPERATING, MONITORING AND REPORTING REQUIREMENTS

<u>LIMITATION</u>		<u>MINIMUM MONITORING REQ.</u>	<u>MINIMUM REPORTING REQUIREMENTS</u>
<u>Characteristic</u>		<u>Freq.</u>	<u>Type</u>
*Injection Pressure	1823 psig (MAXIMUM)	semi-monthly	quarterly
Cumulative Injected Volume		daily	quarterly
Cumulative Produced Volume		daily	quarterly
Specific Gravity		monthly grab	quarterly
**Chemical Composition of Injected Fluid		quarterly grab	quarterly

SAMPLING LOCATION: The sampling location shall be at each injection pump discharge before the manifold system

\*The limitation on wellhead pressure serves to prevent confining-formation fracturing. This limitation was calculated using the following formula:  $[\{0.8 \text{ psi/ft} - (0.433 \text{ psi/ft})(\text{specific gravity})\} \times \text{depth}] - 14.7 \text{ psi}$ . The maximum wellhead pressure is dependent upon depth and specific gravity of the injected fluid. The A-1 Evaporite at 7479 feet was used as the depth and a specific gravity of 1.28 was used for the injected fluid.

\*\*Chemical composition analysis shall include, but not be limited to, the following: Sodium, Calcium, Barium, Magnesium, Total Iron, Chloride, Sulfate, Carbonate, Bicarbonate, Sulfide, Total Dissolved Solids, pH, Resistivity (ohm-meters @ 75°F), and Specific Gravity.



Composition of Injected Fluids

The injection fluids to the solution mining wells will consist of the following:

- low quality solutions from the solution mining operation
- fresh water from water wells and site run-off from rainfall
- recycled solution from the refinery
- boiler blow down fluid
- facility purge and flush water

Plugging and Abandonment Cementing Data

1. The cavity shall be depressured until the well is completely dead.
2. Run in with tubing and bridge plug to a point at, or near, the top of the cavity.
3. Set bridge plug in competent casing as close as possible to the top of the cavity.
4. Rig up cementing truck and set 50 sack plug of Class A cement above bridge plug. 50 sack plug, Class A = 226'.
5. Pull tubing up through cement to top of plug.
6. Continue to plug 7" casing, using 50/50 Poz cement.  
Yield: 1.29 cu. ft./sack; 100 sack = 129 cu. ft. = 583'/100 sacks.
7. Continue to plug to within 226' of surface. Set 50 sack plug of Class A cement at surface. Cut off and cap 3' below surface.
8. Summary: Set bridge plug at 7780'.

1st plug	7780-7574'	Class A, 3% Cl <sub>2</sub>	50 sacks
2nd plug	7574-6991'	50-50 Poz	100 sacks
3rd plug	6991-6400'	50-50 Poz	100 sacks
4th plug	6400-5825'	50-50 Poz	100 sacks
5th plug	5825-5242'	50-50 Poz	100 sacks
6th plug	5242-4659'	50-50 Poz	100 sacks
7th plug	4659-4076'	50-50 Poz	100 sacks
8th plug	4076-3493'	50-50 Poz	100 sacks
9th plug	3493-2910'	50-50 Poz	100 sacks
10 plug	2910-2327'	50-50 Poz	100 sacks
11 plug	2327-1744'	50-50 Poz	100 sacks
12 plug	1744-1161'	50-50 Poz	100 sacks
13 plug	1161-576'	50-50 Poz	100 sacks
14 plug	576-291'	50-50 Poz	50 sacks
15 plug	291-0'	Class A	60 sacks


 UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
 WASHINGTON, D.C. 20460

**PLUGGING AND ABANDONMENT PLAN**

 Wells drilled after  
 1985

WELL NAME &amp; NUMBER, FIELD NAME, LEASE NAME &amp; NUMBER

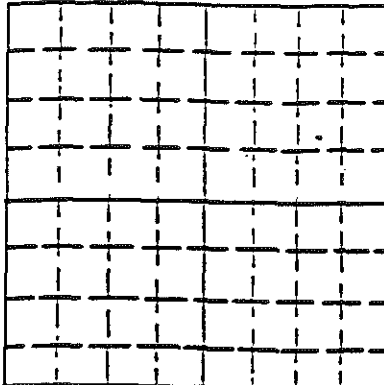
 Hersey Potash Facility  
 Solution Mining Wells

NAME, ADDRESS, &amp; PHONE NUMBER OF OWNER/OPERATOR

 Kalium Chemicals, Ltd.  
 Suite 100, The East Tower, 2550 Golf Road  
 Rolling Meadows, IL 60008-4051

 Locate Well And Outline Unit On  
 Section Plat — 640 Acres

N



STATE

MI

COUNTY

Osceola

STATE PERMIT NUMBER

SURFACE LOCATION DESCRIPTION

LOCATE WELL IN TWO DIRECTIONS FROM NEAREST LINES OF QUARTER SECTION AND DRILLING UNIT

 Surface  
 Location \_\_\_\_\_ ft. From (N/S) \_\_\_\_\_ Line Of Quarter Section

And \_\_\_\_\_ ft. From (E/W) \_\_\_\_\_ Line Of Quarter Section

**TYPE OF AUTHORIZATION**

- ☐ Individual Permit  
☐ Rule  
☒ Area Permit

 Number of Wells 8  
 In Area Permit \_\_\_\_\_

U.S.EPA Permit Number \_\_\_\_\_

**WELL  
ACTIVITY**

- ☐ Class I  
☐ Hazardous  
☐ Nonhazardous  
☐ Class II  
☐ Brine Disposal  
☐ Enhanced Recover  
☐ Hydrocarbon Stora  
☒ Class III  
☐ Class V

**CASING/TUBING/CEMENT RECORD AFTER PLUGGING AND ABANDONMENT**

Size	WT (lb./ft.) TUB./CSG	Original Annulus (CSG) (in.)	CSG TO BE LEFT IN WELL (in.)	Hole Size (in.)	Seals Cement Used	Type
18-5/8	86	600	600	24"	840	Lite/Class A
13-3/8	54	900	900	17-1/2"	700	Lite/Class A
9-5/8	40	5450	5450	12-1/4"	1700	Lite/Class A
7	23-29	7800	7800	8-1/2"	1180	Lite/Class A

**METHOD OF EMPLACEMENT  
OF CEMENT PLUGS**

- ☐ The Balance Method  
☐ The Dump Sailer Method  
☐ The Two Plug Method  
☐ Other, Explain:

CEMENT TO PLUG AND ABANDON DATA:		Plug # 1	Plug #	Plug #	Plug #	Plug #	Plug # 1 &	Plug # 15
Size of Hole or Pipe in Which Plug Will Be Placed (inches)		7					7	7
Calculated Top of Plug (ft.)		7574	Plugs 2 through 13				291	0
Measured Top of Plug (ft.)			7574 to 576 feet					0
Depth to Bottom of Plug (ft.)		7700	continuous cement in				576	291
Sacks of Cement to be Used		50	100 sack (583') intervals.				50	60
Slurry Volume to be Used (cu. ft.)		53	Use 50-50 Poz cement at				64	64
Slurry Weight (lb./gal.)		15.5	14.5 lb/gal.				14.5	15.6
Type of Cement, Soaker or Other Material Used		Class A					50/50Poz	Class
Type of Preflush Used		Brine						

**DESCRIPTION OF PLUGGING PROCEDURE**

Estimated cost/well = \$22,000.00 Total cost for 8 wells = \$176,000.00

**ESTIMATED COST OF PLUGGING AND ABANDONMENT**

Cement	\$	Cast Iron Bridge Plug	\$
Logging	\$	Cement Retainer	\$
Rig or Pulling Unit	\$	Miscellaneous	\$

**CERTIFICATION**

I certify under the penalty of law that I have examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment. (Ref. 40 CFR 144.32)

NAME AND OFFICIAL TITLE (Please type or print)

Donald D. Metzger

SIGNATURE

DATE SIGNED

11-27-87


 UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
 WASHINGTON, D.C. 20460

**PLUGGING AND ABANDONMENT PLAN**

 Wells drilled prior  
 to 1985

WELL NAME &amp; NUMBER, FIELD NAME, LEASE NAME &amp; NUMBER

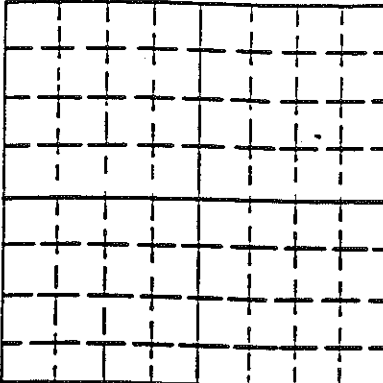
 Hersey Potash Facility  
 Solution Mining Wells

NAME, ADDRESS, &amp; PHONE NUMBER OF OWNER/OPERATOR

 Kalium Chemicals, Ltd.  
 Suite 100, The East Tower  
 2550 Golf Rd.; Rolling Meadows, IL 60008-4051

 Locate Well And Outline Unit On  
 Section Plat — 640 Acres

N



S

STATE

MI

COUNTY

Osceola

STATE PERMIT NUMBER

SURFACE LOCATION DESCRIPTION

LOCATE WELL IN TWO DIRECTIONS FROM NEAREST LINES OF QUARTER SECTION AND DRILLING UNIT

 Surface  
 Location \_\_\_\_\_ ft. From (N/S) \_\_\_\_\_ Line Of Quarter Section

And \_\_\_\_\_ ft. From (E/W) \_\_\_\_\_ Line Of Quarter Section

**TYPE OF AUTHORIZATION**

- ☐ Individual Permit  
☐ Rule  
☒ Area Permit

 Number of Wells \_\_\_\_\_ 8  
 In Area Permit \_\_\_\_\_

U.S.EPA Permit Number \_\_\_\_\_

**WELL  
ACTIVITY**

- ☐ Class I  
☐ Hazardous  
☐ Nonhazardous  
☐ Class II  
☐ Brine Disposal  
☐ Enhanced Recovery  
☐ Hydrocarbon Storage  
☒ Class III  
☐ Class V

**CASING/TUBING/CEMENT RECORD AFTER PLUGGING AND ABANDONMENT**

Size	WT (lb./ft.) T&G/CSG	Original Amount (CSG) (ft.)	CSG to be Left in Well (ft.)	Hole Size (in.)	Excess Cement Used	Type
13-3/8"	54	900	900	17-1/2"	700	Lite/Class A
9-5/8"	40	5450	5450	12-1/2"	1700	Lite/Class A
7"	23	7800	7800	8-1/2"	1180	Lite/Poz/Class H

**METHOD OF EMPLACEMENT  
OF CEMENT PLUGS**

- ☐ The Balance Method  
☐ The Dump Bailer Method  
☐ The Two Plug Method  
☐ Other. Explain:

CEMENT TO PLUG AND ABANDON DATA:		Plug # 1	Plug #	Plug #	Plug #	Plug #	Plug # 14	Plug # 15
Size of Hole or Pipe in Which Plug Will Be Placed (inches)		7"					7"	7"
Calculated Top of Plug (ft.)		7574	Plugs 2 through 13				291	0
Measured Top of Plug (ft.)			7574 to 576 feet					
Depth to Bottom of Plug (ft.)		7780	continuous cement in				576	291
Sacks of Cement to be Used		50	100 sack (583') intervals.				50	60
Slurry Volume to be Used (cu. ft.)		53	Use 50-50 Poz cement at				64	64
Slurry Weight (lb./gal.)		15.6	14.5 lb/gal.				14.5	15.6
Type of Cement, Spacer or Other Material Used		Class A					60/50 Poz	Class A
Type of Preflush Use		Brine						

**DESCRIPTION OF PLUGGING PROCEDURE**

Estimated cost/well = \$22,000.00 Total cost for 8 wells = \$176,000.00

**ESTIMATED COST OF PLUGGING AND ABANDONMENT**

Cement	\$	Cast Iron Bridge Plug	\$
Logging	\$	Cement Retainer	\$
Rig or Pulling Unit	\$	Miscellaneous	\$

**CERTIFICATION**

I certify under the penalty of law that I have examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment. (Ref. 40 CFR 144.32)

NAME AND OFFICIAL TITLE (Please type or print)

 Donald D. Metzger  
 Resident Manager

SIGNATURE

DATE SIGNED

11-27-91



CORRECTIVE ACTION PLAN

No corrective action is required at this time

Names and Locations of Wells Authorized Under This Permit

<u>Well Name</u>	<u>Surface Location</u>
1. KCL 1011	SE/4-NW/4-NW/4 of section 26-T17N-R9W
2. KCL 1012	SE/4-NW/4-NW/4 of section 26-T17N-R9W
3. KCL 1041	SW/4-NW/4-NW/4 of section 26-T17N-R9W
4. KCL 1042	SW/4-NW/4-NW/4 of section 26-T17N-R9W
5. KCL 1051	SW/4-NW/4-NW/4 of section 26-T17N-R9W
6. KCL 1052	SW/4-NW/4-NW/4 of section 26-T17N-R9W
7. KCL 2031	W LINE-NE/4-SW/4 of section 26-T17N-R9W
8. KCL 2061	N/2-SW/4 of section 26-T17-R9W

The solution mining injection wells will be limited to the following area:  
The SE/4 of Section 22, The S/2 of Section 23, The E/2 of Section 27, All  
Section 26, The NE/4 of Section 34, The N/2 of Section 35, all in Township  
17W, Range 9W.

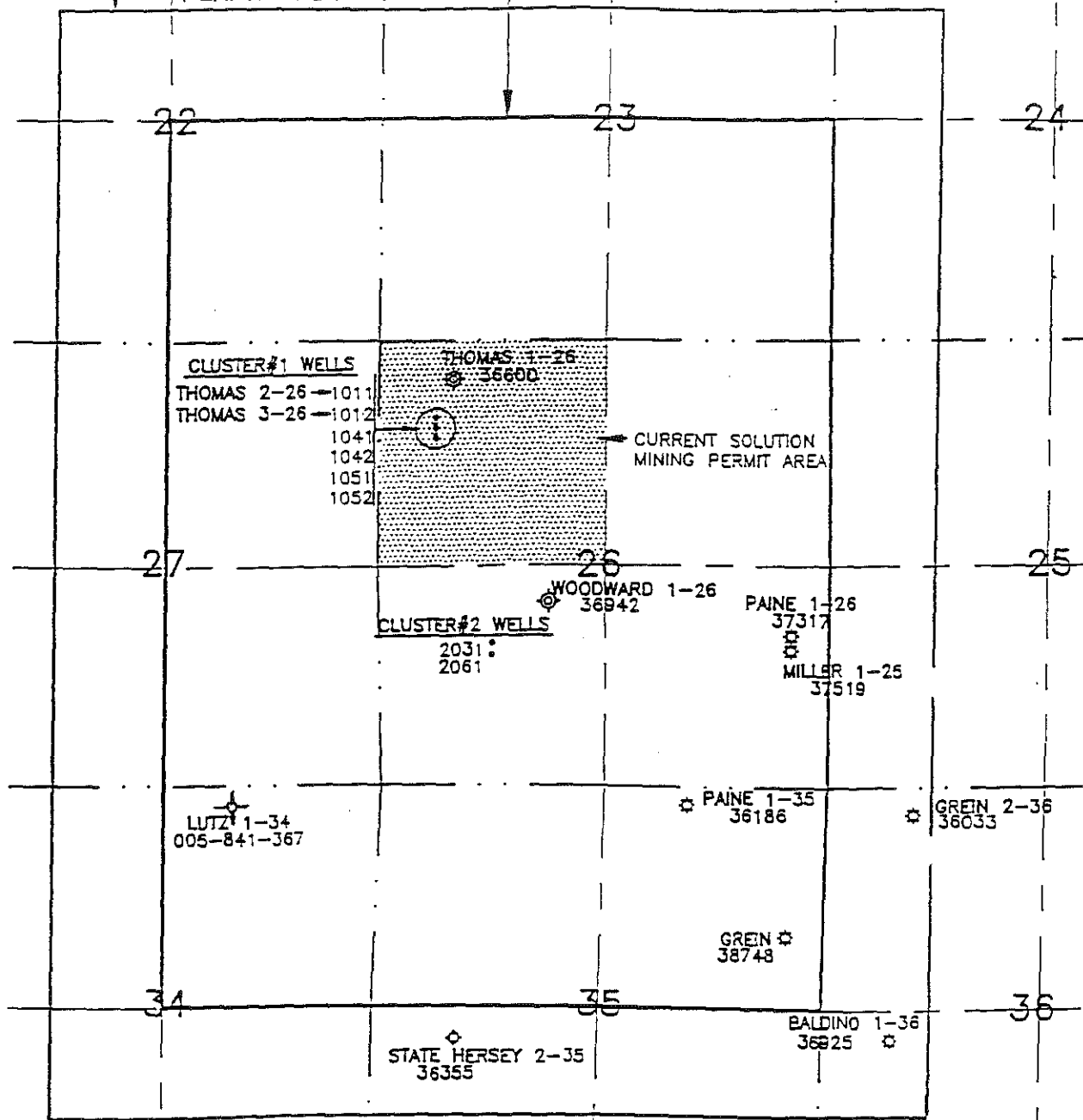
MUSKEGON RIVER

MI-133-3G-A002

Page D-2 of 2

1/4 MILE WIDTH  
CIRCUMSCRIBING  
PERMIT AREA

PROPOSED SOLUTION  
MINING PERMIT AREA



HERSEY  
GRANT

TOWNSHIP T17N R9W

TOWNSHIP T16N R9W

- SOLUTION MINING WELLS
- ⊗ GAS WELL
- ⊙ DISPOSAL WELLS
- ⊕ ABANDONED MINERAL TEST WELL

⊙ DRY HOLE

JOB No. USP-0020

DRAWN PS

NOV.7/91

CHECKED

APPROVED

KALIUM CHEMICALS,LTD.

TITLE - AREA OF REVIEW

SCALE

1" = 2000'

DRG. No. - FIGURE A-1

REV. 1

PS NOV.91

ADDED GREIN 38748





UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION 5

77 WEST JACKSON BOULEVARD

CHICAGO, IL 60604-3590

FACT SHEET FOR ISSUANCE OF UNDERGROUND INJECTION CONTROL (UIC)  
CLASS III AREA PERMIT - SOLUTION MINING OF SALT

REPLY TO THE ATTENTION OF:

Permit Number: MI-133-3G-A002

Project Name : Hersey Potash Project

Kalium Chemicals, Ltd. of Rolling Meadows, Illinois, has applied to the United States Environmental Protection Agency (USEPA) for an area permit to construct and operate injection wells to be used for solution mining of potash in Osceola County, Michigan.

Review of the permit application indicates that no significant environmental impact should result from the proposed injection. The USEPA, therefore, intends to issue a permit for six existing and two proposed solution mining injection wells in an area limited to the SE/4 of section 22, the S/2 of section 23, the E/2 of section 27, all section 26, the NE/4 of section 34, the N/2 of section 35, all in Township 17N, Range 9W.

Under the authority of Title 40, Code of Federal Regulations (CFR) Parts 144 and 146, USEPA permits must specify conditions for construction, operation, monitoring, reporting, and plugging and abandonment of injection wells so as to prevent the movement of fluids into any underground sources of drinking water (USDW). General provisions for USEPA UIC permit requirements are found at 40 CFR Parts 144 and 146, while regulations specific to Michigan injection operations are found at 40 CFR Part 147 Subpart X. In accordance with 40 CFR 124.8, general information and highlighted permit conditions specific to these wells are as follows:

Area of Review (AOR) and Corrective Action: In accordance with 40 CFR 144.55, 146.6 and 146.7, this is the area in and around the permit area within which the applicant must research, examine and develop a program to address, with a corrective action plan, wells which penetrate the injection zone that are improperly sealed, completed or abandoned and may, therefore, provide a conduit for fluid migration. The applicant has provided documentation on the well population within 1/4 mile of the permit area (i.e., the AOR). There are eight solution mining, six producing, two injection, 0 temporarily abandoned and two plugged and abandoned wells within the area of review which penetrate the injection zone.

Facility Description: Kalium markets potash worldwide with the major percentage used as fertilizer and the balance in chemical and industrial applications. Kalium's mining process in Michigan involves pumping a solution through boreholes in potash beds 7500 feet below the surface, dissolving the potash-bearing portion of the ores and returning the solution to surface for refining. The solution is processed through a series of crystallizers where the potash crystals are formed. The crystals are then dried and sifted through a series of special screens to assure a consistent particle size. The mining operation produces some solution that is not of high enough

quality to be refined. This weaker solution is disposed into a porous limestone formation 4000 feet below surface. Kalium ships bulk potash via hopper trucks directly to customers or to offsite storage warehouses.

Underground Sources of Drinking Water (USDWs): USDWs are defined by the UIC regulations as aquifers or portions thereof which contain less than 10,000 milligrams per liter of total dissolved solids and which are being or could be used as a source of drinking water. The base of the lowermost possible USDW in the vicinity of the injection wells has been identified at approximately 672 feet below ground surface. This water bearing formation is the Glacial Drift.

Injection and Confining Zones: Injection of fluids for solution mining of potash is limited by the permit to the A-1 Evaporite in the interval between 7479 and 7896 feet below ground surface. This injection zone is separated from the lowermost USDW by approximately 6807 feet of sedimentary rock strata.

Construction Requirements: Pursuant to 40 CFR 146.32, all new Class III wells shall be cased and cemented to prevent the migration of fluids into or between underground sources of drinking water (USDWs). The permittee shall not commence construction, including drilling and conversion of any well until a final permit has been issued. Pursuant to 40 CFR 144.52(a)(1), all existing wells shall demonstrate the absence of fluid movement behind the casing within five (5) months of the permit's effective date by running a noise, temperature or oxygen activation log. The operator will be required to repeat this test at least once every five (5) years, thereafter.

Injection Fluid: The injected fluid shall be restricted to those fluids listed in Page A2 of 2. The maximum daily volume of fluid to be injected will be limited to 17,857 barrels.

Maximum Injection Pressure: The maximum wellhead injection pressure shall be limited to 1823 pounds per square inch gauge (psig). This limitation will ensure that the pressure during injection does not initiate fractures in the confining zone adjacent to the lowermost USDW during injection operations. This in turn ensures that the injection pressure will not cause the movement of injection or formation fluids into a USDW as prohibited by 40 CFR 146.33(a)(1).

Monitoring and Reporting Requirements: In accordance with 40 CFR 144.54 and 146.33, the applicant will be responsible for observing and recording injection pressure semi-monthly and reporting this to the USEPA on a quarterly basis. The cumulative injected and produced volume shall be monitored daily and shall be reported quarterly. The specific gravity shall be monitored monthly and shall be reported quarterly. An analysis of the injected fluid must be submitted on a quarterly basis. In addition, the applicant is required to conduct and pass a two part mechanical integrity test (MIT) on each well in accordance with 40 CFR 146.8, within the compliance schedule established in the final issued permit. The applicant will be required to repeat the first part of MIT (i.e., absence of significant leaks in the

casing) and also the second part of MIT (i.e., the absence of fluid movement behind the casing) at least once every sixty (60) months from the last approved demonstration. These tests will provide USEPA with an evaluation of the integrity of the casing, as well as a determination of the absence or presence of fluid movement behind the casing.

Plugging and Abandonment: In accordance with 40 CFR 146.10 and 146.34(c), the permit includes a plugging and abandonment plan for environmentally protective well closure at the time of cessation of operations. Kalium Chemicals, Ltd. has demonstrated adequate financial responsibility to close, plug, and abandon this underground injection operation. Kalium Chemicals, Ltd. has provided Financial Statement Coverage as financial assurance for the Company's injection wells in the State of Michigan. This coverage must be updated on an annual basis.

Issuance and Effective Date of Permit: In accordance with 40 CFR 124.15, the permit will become effective immediately upon issuance if no public comments were received that requested a change in the draft permit. However, in the event that public comments are received and requesting a change in the draft permit, then the permit will become effective thirty (30) days after the date of issuance unless the permit is appealed. In accordance with 40 CFR 144.36(a), the permit will be in effect for the life of the operation unless it is otherwise modified, revoked and reissued, or terminated as provided at 40 CFR 144.39, 144.40 and 144.41. The permit will be reviewed by the USEPA at least once every five (5) years from its effective date for consistency with new or revised Federal regulations.

Questions, and requests for additional information or for a public hearing may be submitted in writing to the contact person listed below or made verbally to Patrick Saieh at (312) 886-4240. The public comment period on this permitting action will close thirty (30) days after the date of the public notice. If the USEPA receives written comments of substantial public interest that warrant a hearing on this action, a public notice of a scheduled hearing will be published locally and mailed to interested parties. In accordance with 40 CFR 124.19(a) any person who filed comments on the draft permit which preceded this final permit, or who participated in the public hearing, may petition the administrator to review any condition of this permit within 30 days of the service of notice of the Director's action, unless a later date is specified in that notice. Any person who failed to file comments, or failed to participate in the public hearing on the draft permit, may petition for administrative review only to the extent of the changes from the draft to the final permit decision.

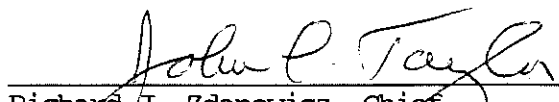
The petition shall include a statement of the reason(s) supporting that review, including a demonstration that any issues being raised were raised during the public comment period, including any public hearing to the extent required by these regulations and when appropriate, a showing that the condition in question is based on: A finding of fact or conclusion of law which is clearly erroneous or an exercise of discretion or an important policy consideration which the Administrator should, in his or her discretion review.

The Administrator may also decide on his or her initiative to review any condition of this permit. He or she must act within 30 days of the service date of the Director's action. Within a reasonable time following the filing of the petition for review, the Administrator shall issue an order either granting or denying the petition for review. To the extent review is denied, the condition of the final permit decision becomes final agency action. A petition to the Administrator under 124.19(a), is a prerequisite to the seeking of judicial review of the final agency action. For purposes of judicial review, final agency action occurs when the final permit is issued or denied by EPA and agency review procedures are exhausted.

To preserve the right to appeal any final permit decision that may be made in this matter under 40 C.F.R. Part 124, you must either participate in the public hearing or send in written comments on the draft permit decision. This first appeal must be made to the Administrator; only after all agency review procedures have been exhausted may you file an action in the appropriate Circuit Court of Appeals for review.

U.S. Environmental Protection Agency  
Region V, (WD-17J)  
77 W Jackson Blvd.  
Chicago, Illinois 60604

Attn: Richard J. Zdanowicz, Chief  
Underground Injection Control Section

  
Richard J. Zdanowicz, Chief  
Underground Injection Control Section

PERMIT UNIT CHIEF'S  
CONCURRENCE FORM

MAR 11 1992

DOCUMENT SUBJECT

To Extend Comment  
Period Public Notice  
for Kalium Chemicals

Name

Initials

Date

Typist

M. Redding

MR

2/25/92

Originator(s) Name(s)

Patrick Strick

P.S.

2/25/92

Reviewer(s)

David Werbach

De

2/25

Allen Melcer

Unit Secretary - Kellye

Fred H

FH

2/25

Unit Chief-Becky Harvey

BLH

2/25

SPECIAL INSTRUCTIONS (IF ANY)

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

CLASS III  
UNDERGROUND INJECTION CONTROL PERMIT  
FINAL PERMIT FOR SIGNATURE

Permittee: KALIUM CHEMICALS, Ltd.  
City/State: ROLLING MEADOWS, ILLINOIS

UIC Permit No: MI-133-3G-A002  
County: OSCEOLA  
Well: HERSEY POTASH PROJECT

End of 30 Day Comment Period 4/10/92

A. No Comments received

B. No Changes to the Draft Permit

C. Comments Received 2 (LETTERS ENCLOSED)

1. Significant
2. Non-Significant

D. Changes made to the Draft Permit

Pages	Change(s) Made
1.	
2.	
3.	

E. No Change(s): Final Permit Concurrence

1. Permit Writer	<u>PATRICK SAIEH</u>	Date:	<u>4/13/92</u>
2. <del>UIC Section Chief</del>	<del>Resonance J. Hawley</del>	Date:	<u>4/13/92</u>
3. <del>Permit Unit Chief</del>	<del>DR. H. J. G. Van der Vliet</del>	Date:	<u>4/15/92</u>
4. SDW Branch Chief/Secy		Date:	<u>4/15</u>
5. Permit Administrator		Date:	
6. Deputy Water Div. Dir.		Date:	
7. Water Div. Director		Date:	
8. Permit Administrator	<u>McElderry</u>	Date:	<u>4/20/92</u>

F. Changes: Final Permit Concurrence

1. Permit Writer	Date:
2. Permit Team Leader	Date:
3. Enforcement Coordinator	Date:
4. Permit Unit Chief	Date:
5. UIC Section Chief	Date:
6. SDW Branch Chief	Date:
7. Permit Administrator	Date:
8. Deputy Water Div. Dir.	Date:
9. Water Div. Director	Date:
10. Permit Administrator	Date:

Action Required

\* Water Div. Director: Please sign both original cover pages (two provided)  
Signature of company letter by WD Director?  
(If yes, please keep with permit)

UIC: Form Letter \_\_\_\_\_ Typing/Hold file? \_\_\_\_\_

Mail Co. 4/20/92 cc IDEM or 4/30/92 cc DNR w/c 4/30/92 cc EEI 4/30/92 RecGreenCard 4/23/92



CLASS III  
UNDERGROUND INJECTION CONTROL PERMIT  
DRAFT PERMIT FOR SIGNATURE

Permittee: KALIUM CHEMICALS, Ltd. UIC Permit No: MI-133-3G-A002

City/State: ROLLING MEADOWS, ILLINOIS County: OSCEOLA

Well: HERSEY POTASH PROJECT

1. Permit Writer:	<u>PATRICK SAIEH</u>	Date:	<u>12/16/91</u>
2. Permit Team Leader:	<u>[Signature]</u>	Date:	<u>12/12/91</u>
3. Enforcement Coordinator:	<u>J. Chruscicki</u>	Date:	<u>12/18/91</u>
4. Permit Unit Chief	<u>[Signature]</u> Permit Secy <u>[Signature]</u>	Date:	<u>12/19/91</u>
5. UIC Section Chief	<u>[Signature]</u>	Date:	<u>12/19/91</u>
6. Permit Administrator	<u>M.E. Redding</u>	Date:	<u>12/30/91</u>

COMMENTS - Specify page and Section

Permit Unit Tracking

Draft Transmittal Mail Co. 12/30/91 cc: IDEM or DNR with copy 12/30/91 EEI 12/30 bcc: Enf. 12/30 Rec'd Green 1/2/92

Public Notice JAN 29 1992 Mailed 1/29/92

Repository Mailed REED City Public Library 12/30/91 1/25/92 Send Copy

Copies made 3

Published in the CADILLAC NEWS  
1/29/92

Area of Review \_\_\_\_\_ Typed ✓ Mailed 1/29/92

Administrative File \_\_\_\_\_ Logs ✓



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
REGION 5  
77 WEST JACKSON BOULEVARD  
CHICAGO, IL 60604-3590

Page 1 of 17

UNDERGROUND INJECTION CONTROL MINOR PERMIT MODIFICATION:  
**CLASS III AREA PERMIT**

REPLY TO THE ATTENTION OF:

Permit Number: MI-133-3G-A002

Project Name : Hersey Potash Project

Pursuant to the provisions of the Safe Drinking Water Act, as amended (42 U.S.C. 300f et seq., commonly known as the SDWA) and implementing regulations promulgated by the United States Environmental Protection Agency (USEPA) at Parts 124, 144, 146 and 147 of Title 40 Code of Federal Regulations (CFR), Kalium chemicals, Ltd. of Rolling Meadows, Illinois is authorized to operate eleven existing solution mining injection wells located in Michigan, Osceola County, in a permit area limited to that described in Part III(D) of this permit. Injection shall be limited to the Salina Group between 5765 and 7896 feet, upon the express condition that the permittee meet the restrictions set forth herein. The names and locations of wells authorized under this permit and a map of the permit area are provided in Part III(D) of this permit. Injection shall not commence into any newly drilled or converted well until the operator has received authorization in accordance with Part I(E)(11) of this permit. Additional injection wells may be constructed and operated within the permit area provided that the permittee notifies the Director prior to construction and all permit requirements are met.

All references to 40 Code of Federal Regulations are to all regulations that are in effect on the date that this permit is effective.

This permit is a minor permit modification of an existing area permit which was signed on April 15, 1992, and shall remain in full force and effect during the operating life of the field, unless this permit is otherwise revoked, terminated, modified or reissued pursuant to 40 CFR 144.39 or 144.40 and 144.41. This permit shall also remain in effect upon delegation of primary enforcement responsibility to the State of Michigan unless that State chooses to adopt this permit as a State permit. This permit will be reviewed at least every five (5) years from the effective date specified above.

Signed and date: December 15, 1993

Eleanor P. Watter

for Dale S. Bryson  
Director, Water Division





UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION 5

77 WEST JACKSON BOULEVARD

CHICAGO, IL 60604-3590

Page 1 of 17

REPLY TO THE ATTENTION OF:

UNDERGROUND INJECTION CONTROL CLASS III AREA PERMIT

Permit Number: MI-133-3G-A002


Project Name : Hersey Potash Project

Pursuant to the provisions of the Safe Drinking Water Act, as amended (42 U.S.C. 300f et seq., commonly known as the SDWA) and implementing regulations promulgated by the United States Environmental Protection Agency (USEPA) at Parts 124, 144, 146 and 147 of Title 40 of the Code of Federal Regulations (CFR), Kalium Chemicals, Ltd. of Rolling Meadows, Illinois is authorized to operate six existing and two proposed solution mining injection wells located in Michigan, Osceola County, in a permit area limited to that described in Part III(D) of this permit. Injection shall be limited to the A-1 Evaporite between 7479 and 7896 feet, upon the express condition that the permittee meet the restrictions set forth herein. The names and locations of wells authorized under this permit and a map of the permit area are provided in Part III(D) of this permit. Injection shall not commence into any newly drilled or converted well until the operator has received authorization in accordance with Part I(E)(11) of this permit. Additional injection wells may be constructed and operated within the permit area provided that the permittee notifies the Director prior to construction and all permit requirements are met.

All references to 40 Code of Federal Regulations are to all regulations that are in effect on the date that this permit is effective.

This permit shall become effective on MAY 15 1992 and shall remain in full force and effect during the operating life of the field, unless this permit is otherwise revoked, terminated, modified or reissued pursuant to 40 CFR 144.39, 144.40 and 144.41. This permit shall also remain in effect upon delegation of primary enforcement responsibility to the State of Michigan unless that State chooses to adopt this permit as a State permit. This permit will be reviewed at least every five (5) years from the effective date specified above.

Signed and dated: 4/15/1992

  
Dale S. Bryson  
Director, Water Division

OPERATING, MONITORING AND REPORTING REQUIREMENTS

<u>LIMITATION</u>	<u>MINIMUM MONITORING REQ.</u>	<u>MINIMUM REPORTING REQUIREMENTS</u>
<u>Characteristic</u>	<u>Freq.</u>	<u>Type</u>
*Injection Pressure	1402 psig (MAXIMUM)	semi-monthly quarterly
Cumulative Injected Volume	daily	quarterly
Cumulative Produced Volume	daily	quarterly
Specific Gravity	monthly grab	quarterly
**Chemical Composition of Injected Fluid	quarterly grab	quarterly

SAMPLING LOCATION: The sampling location shall be at each injection pump discharge before the manifold system.

\*The limitation on wellhead pressure serves to prevent confining-formation fracturing. This limitation was calculated using the following formula:  

$$[(0.8 \text{ psi/ft} - (0.433 \text{ psi/ft})(\text{specific gravity})) \times \text{depth}] - 14.7 \text{ psi}]$$
 The maximum wellhead pressure is dependent upon depth and specific gravity of the injected fluid. The Salina Group at 5765 feet was used as the depth and a specific gravity of 1.28 was used for the injected fluid.

\*\*Chemical composition analysis shall include, but not be limited to, the following: Sodium, Calcium, Barium, Magnesium, Total Iron, Chloride, Sulfate, Carbonate, Bicarbonate, Sulfide, Total Dissolved Solids, pH, Resistivity (ohm-meters @ 75°F), and Specific Gravity.



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION 5

77 WEST JACKSON BOULEVARD

CHICAGO, IL 60604-3590

Page 1 of 17

REPLY TO THE ATTENTION OF:

UNDERGROUND INJECTION CONTROL CLASS III AREA PERMIT

Permit Number: MI-133-3G-A002

Project Name : Hersey Potash Project

Pursuant to the provisions of the Safe Drinking Water Act, as amended (42 U.S.C. 300f et seq., commonly known as the SDWA) and implementing regulations promulgated by the United States Environmental Protection Agency (USEPA) at Parts 124, 144, 146 and 147 of Title 40 of the Code of Federal Regulations (CFR), Kalium Chemicals, Ltd. of Rolling Meadows, Illinois is authorized to operate six existing and two proposed solution mining injection wells located in Michigan, Osceola County, in a permit area limited to that described in Part III(D) of this permit. Injection shall be limited to the A-1 Evaporite between 7479 and 7896 feet, upon the express condition that the permittee meet the restrictions set forth herein. The names and locations of wells authorized under this permit and a map of the permit area are provided in Part III(D) of this permit. Injection shall not commence into any newly drilled or converted well until the operator has received authorization in accordance with Part I(E)(11) of this permit. Additional injection wells may be constructed and operated within the permit area provided that the permittee notifies the Director prior to construction and all permit requirements are met.

All references to 40 Code of Federal Regulations are to all regulations that are in effect on the date that this permit is effective.

This permit shall become effective on \_\_\_\_\_ and shall remain in full force and effect during the operating life of the field, unless this permit is otherwise revoked, terminated, modified or reissued pursuant to 40 CFR 144.39, 144.40 and 144.41. This permit shall also remain in effect upon delegation of primary enforcement responsibility to the State of Michigan unless that State chooses to adopt this permit as a State permit. This permit will be reviewed at least every five (5) years from the effective date specified above.

Signed and dated: \_\_\_\_\_

**DRAFT**

\_\_\_\_\_  
Dale S. Bryson  
Director, Water Division

P. SAIEH

OWNERSHIP DATA UIC PERMIT NUMBER MI-133-36-A002

OPERATOR

NAME KALIAM CHEMICALS, Ltd.

STREET 11461 SOUTH 135<sup>th</sup> AVENUE

CITY/ST/ZIP HERSEY, MI 49639

PROJECT/FIELD/UNIT HERSEY POTASH

TOWNSHIP 17N, RANGE 17W, SECTION 26, QTR SECTION NW NW SW COUNTY OSCEOLA

1274 FEET FROM THE N LINE AND

650 FEET FROM THE W LINE

LL DATA WELL STATUS 1.UNDER CONST. ✓ 2. ACTIVE 3.TEMP. ABAND.

4. PLUGGED      5. ANNULAR

SURFACE ELEVATION IS 1145 FEET G. L.

WELL CLASS/TYPE 3 G \*

TOTAL DEPTH IS 8050 FEET

DRILLED ON (DATE) 11/28/93

PLUGGED BACK TO ~~N/A~~ FEET

CONVERTED ON

ABANDONED ON *N/A* (DATE)

	SIZE
SURFACE	<u>13.3/8</u> INCHES
INTERMEDIATE	<u>9.5/8</u> INCHES
PRODUCTION	<u>7.00</u> INCHES
TUBING SIZE	<u>N/A</u> INCHES
DEPTH OF PACKER IS	N/A FEET

DEPTH	CEMENT SACKS	BORE SIZE
822 FEET	480/200 LITE/CASSA	17 1/2
5300 FEET	1650/400 LITE/CASSA	12 1/4
7934 FEET	420 PREMIUM	8 1/2

FRESH WATER, RUN OFF FROM RAIN FALL, RECYCLED SOLUTION FROM REFINER

INJECTION FLUID IS BOILER BLOW DOWN FLUID, FACILITY PURGE & FLUSH WATER

INJECTION VOLUME IS @ 17,857 BBL/DAY

\*\*WELL HEAD INJECTION PRESSURE IS 1402 PSIG (MAX)

INJECTION INTERVAL 1 IS FROM 5765 FEET TO 7896 FEET,

FORMATION IS SALINA GROUP

INJECTION INTERVAL 2 IS FROM

FORMATION IS

\* SEE ATTACHED LIST OF CLASS/TYPES

IF YOU OPERATE 2 OR 3 ENHANCED OIL RECOVERY INJECTION WELLS. ATTACH DATA ON

P. SAIED

OWNERSHIP DATA UIC PERMIT NUMBER MI-133-3G-A002

OPERATOR

NAME KALIM CHEMICALS Ltd

STREET 11461 S. 135<sup>th</sup> STREET AVEN

CITY/ST/ZIP HERSEY, MI 49639

PHONE (616) 832-3755

TOWNSHIP 17N, RANGE 9W, SECTION 26, OTR SECTION NW NW SW COUNTY OSCEOLA

650 FEET FROM THE W LINE

4. PLUGGED      5. ANNULAR

WELL CLASS/TYPE 3G \*

TOTAL DEPTH IS 7900 FEET

DRILLED ON (DATE) 8/2/93

PLUGGED BACK TO ~~NA~~ FEET

CONVERTED ON *N/A*

ABANDONED ON *NA* (DATE)

	SIZE	DEPTH	CEMENT SACKS	BORE SIZE
SURFACE	<u>13.3/8</u> INCHES	<u>825</u> <del>825</del> FEET	<u>680</u>	<u>17 1/2</u>
INTERMEDIATE	<u>9.5/8</u> INCHES	<u>5304</u> FEET	<u>1625</u>	<u>12 1/4</u>
PRODUCTION	<u>7.00</u> INCHES	<u>7845</u> FEET	<u>635</u>	<u>8 1/2</u>
TUBING SIZE	<u>N/A</u> INCHES			
DEPTH OF PACKER IS	<u>N/A</u> FEET			

INJECTION FLUID IS FRESH WATER, RUN-OFF FROM RAIN FALL, RECYCLED SOLUTION FROM REFINERY BOILER  
INJECTION VOLUME IS ~~1028~~ 17,857 BB/ DAY BLOW DOWN FLUID, FACILITY PURGE AND FLUSH WATER

WELL HEAD INJECTION PRESSURE IS 1823

INJECTION INTERVAL 1 IS FROM 7800 FEET TO 7900 FEET,

FORMATION IS A-1 EVAPORITE

INJECTION INTERVAL 2 IS FROM

FORMATION IS

\* SEE ATTACHED LIST OF CLASS/TYPES

F. SAIEH

OWNERSHIP DATA UIC PERMIT NUMBER M1-133-36-A002

OPERATOR

NAME KALIM CHEMICALS Ltd

STREET 11461 SOUTH 135<sup>th</sup> STREET  
(PO BOX 30)

CITY/ST/ZIP HERSEY MICHIGAN

PHONE (616) 852-3755

1219 FEET FROM THE N LINE AND

650 FEET FROM THE W LINE

DATA	WELL STATUS	1.UNDER CDNST.	2. ACTIVE	3.TEMP. ABAND.
1	1			
2	1			
3	1			
4	1			
5	1			
6	1			
7	1			
8	1			
9	1			
10	1			
11	1			
12	1			
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14	1			
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91	1			
92	1			
93	1			
94	1			
95	1			
96	1			
97	1			
98	1			
99	1			
100	1			

4. PLUGGED      5. ANNULAR

SURFACE ELEVATION IS 1145 FEET G L.

WELL CLASS/TYPE 3G \*

TOTAL DEPTH IS 7597 FEET

DRILLED ON (DATE) 6/11/92

PLUGGED BACK TO *N/A* FEET

CONVERTED ON *N/A*

ABANDONED ON *N/A* (DATE)

TUBING CASING

	SIZE
SURFACE	<u>13.3/8</u> INCHES
INTERMEDIATE	<u>9.5/8</u> INCHES
PRODUCTION	<u>7.00</u> INCHES
TUBING SIZE	<u>2.7/8</u> INCHES
DEPTH OF PACKER IS	7430 FEET

DEPTH	CEMENT SACKS	BORE SIZE
904 FEET	425.00 lb C & G 200 lb c. cement	17 1/2
5095 FEET	1320.00 lb C & G 350 lb c. cement	12 1/4
7557 FEET	550 PREMIUM	8 1/2

### INJECTION DATA

INJECTION FLUID IS. Low quality solution FROM THE solution MINING. ~~DO NOT~~

INJECTION VOLUME IS

FROM WATER WELLS AND SITE RUN-OFF FROM RAINFALL, RECYCLED SOLUTION FROM THE REFINERY, BOILER BLOW-DOWN FLUID, FACILITY PURGE AND FLOSH WATER.

\*\*WELL HEAD INJECTION PRESSURE IS 78.23

17,857 BBL/DAY

INJECTION INTERVAL 1 IS FROM 7537 FEET TO 7597 FEET,

• FORMATION IS A-1 EVAPORITE

INJECTION INTERVAL 2 IS FROM

FORMATION IS

\* SEE ATTACHED LIST OF CLASS/TYPES

\*\* IF YOU OPERATE CLASS II ENHANCED OIL RECOVERY INJECTION WELLS, ATTACH DATA ON

MAR 11 1992

### PURPOSE OF PUBLIC NOTICE

The United States Environmental Protection Agency (USEPA) is extending the public comment period from February 29, 1992 to March 29, 1992, concerning a proposal to inject fluids underground via Class III solution mining wells. The purpose of the extension is to provide additional opportunity for written public comments concerning this area permit.

### BACKGROUND

Part C of the Safe Drinking Water Act (SDWA) specifically mandates regulation of the underground injection of fluids through wells to assure that the quality of underground sources of drinking water is protected. Section 1421 of the SDWA requires USEPA to administer Underground Injection Control (UIC) program in states which do not have approved UIC programs. Michigan has not acquired primacy over the UIC program, therefore USEPA is administering the permit program pursuant to regulations at 40 C.F.R. Part 147. As indicated below, the owner has permission of, or has applied for permission to the Michigan Department of Natural Resources (MDNR) pursuant to R299.2211 of the Mineral Well Act, Act No. 315 of the Public Acts of 1969 and also to the USEPA for an area permit pursuant to the USEPA regulations at 40 C.F.R. Part 144.

### FACTS

Six existing and Two proposed injection wells for solution mining of potash are owned and operated by Kalium Chemicals, Ltd. of Rolling Meadows, Illinois

### Osceola County: Hersey Potash Facility:

EPA Area Permit #MI-133-3G-A002 (KCL #1011, MDNR Permit #348-845-767)  
(KCL #1012, MDNR Permit #347-845-767)  
(KCL #1041, MDNR Permit #366-904-767)  
(KCL #1042, MDNR Permit #048-855-567)  
(KCL #1051, MDNR Permit #016-855-567)  
(KCL #1052, MDNR Permit #010-855-567)  
(KCL #2031, MDNR Permit Applied For)  
(KCL #2061, MDNR Permit Applied For)

Permit Writer: Patrick Saieh (312) 886-4240

A copy of the draft area permit is available for viewing at: Reed City Public Library, 410 West Upton, Reed City, Michigan; Monday-Wednesday-Thursday 12 p.m. to 5 p.m., Tuesday 12 p.m. to 8 p.m., Friday 9 a.m. to 5 p.m. and Saturday 10 a.m. to 2 p.m.

### APPEAL

To preserve your right to appeal any final permit decision that may be made in this matter under 40 C.F.R. Part 124 you must either participate in the public hearing or send in written comments on the draft permit decision. The first appeal must be made to the Administrator; only after all agency review procedures have been exhausted may you file an action in the appropriate Circuit Court of Appeals for review.



PUBLIC COMMENTS

If significant written comments are received within 30 days of the date of this notice, a public hearing may be scheduled. If a public hearing is scheduled a notice of the hearing will be published at least 30 days in advance. Written comments will be accepted at the address listed below. All data submitted by the applicant for this permit action is part of the administrative record and is available for review between 9 a.m. to 4 p.m. at the address listed below. It is recommended that you telephone the listed Permit Writer before visiting the Region V office, or for information on the notice:

U.S. Environmental Protection Agency  
UIC Section (Attn: Richard J. Zdanowicz, Chief)  
77 West Jackson Boulevard (WD-17J)  
Chicago, Illinois 60604-3590

WD-17J:P.Saieh:mr:2/25/92

FH  
2/25  
Rut  
2/25

men 2/25/92

P.S. 2/25/92

AW 2/25



APR 23 1992

WD-17J

CERTIFIED MAIL P 874 011 129  
RETURN RECEIPT REQUESTED

Mr. Kenneth F. Ford  
Registered Forester  
Wildlife Manager  
Lake States Forestry Consultants  
11805 South 120th Street  
Hersey, Michigan 49639

Re: **Public Comments on United States Environmental Protection Agency (USEPA)**  
**Final Area Permit #MI-133-3G-A002.**

Dear Mr. Ford:

Thank you for your letter of April 9, 1992, regarding the above-referenced final area permit.

As I stated in my letter of March 11, 1992, the purpose of the Underground Injection Control (UIC) program is to prevent contamination of Underground Sources of Drinking Water (USDWs) by regulating the construction and operation of injection wells. In your letter, you have requested that Kalium Chemicals, Ltd. be required to recycle their injected water. Please be advised that there are no provisions under the Safe Drinking Water Act (SDWA) which allows the USEPA to require owners/operators of Class III injection wells to recycle their injection water as you have requested. Since all of the concerns you have raised are related to fresh water wells, which comes under the purview of the Michigan Department of Public Health; we feel that perhaps your questions will be more fully addressed by contacting Mr. Mike Ulrich, Osceola County Department of Public Health, 115 N. Sears, Reed City, Michigan 49677.

If you have any further questions, please contact Patrick Saieh of my staff at (312) 886-4240.

Sincerely yours,

Richard J. Zdanowicz, Chief  
Underground Injection Control Section

WD-17J:P.Saieh:fh:4/15/92  
Patrick's Disk #9  
Document Name: Kenn

UIC CONTROL #43

P.S. 4/20/92

*AmforH*  
*4/20*

*FH*  
*4/20/92*

*Wm*  
*4/20*

*RLH for*  
*RJZ*  
*4/23/92*

P. Saieh

P 874 011 129



# Certified Mail Receipt

No Insurance Coverage Provided

Do not use for International Mail

(See Reverse) UIC nr

WD-17J

Sent to Mr. Kenneth F. Ford Registered Forester Wildlife Manager Lake States Forestry Consultants 11805 South 120th Street Hersey, Michigan 49639	
Postage	\$ .29
Certified Fee	1.00
Special Delivery Fee	
Restricted Delivery Fee	
Return Receipt Showing to Whom & Date Delivered	1.00
Return Receipt Showing to Whom Date, & Address of Delivery	
TOTAL Postage & Fees	\$2.29
Postmark or Date	APR 24 1992

PS Form 3800, June 1990

WD-17J UIC nr

P. SAIEH

**SENDER:** Complete items 1 and 2 when additional services are desired, and complete items 3 and 4.

Put your address in the "RETURN TO" Space on the reverse side. Failure to do this will prevent this card from being returned to you. The return receipt fee will provide you the name of the person delivered to and the date of delivery. For additional fees the following services are available. Consult postmaster for fees and check box(es) for additional service(s) requested.

1. ☐ Show to whom delivered, date, and addressee's address. (Extra charge)  
2. ☐ Restricted Delivery (Extra charge)

3. Article Addressed to: Mr. Kenneth F. Ford Registered Forester Wildlife Manager Lake States Forestry Consultants 11805 South 120th Street Hersey, Michigan 49639		4. Article Number P 874 011 129	
5. Signature - Addressee X <i>Robert A. Suez</i>		Type of Service: <input type="checkbox"/> Registered <input type="checkbox"/> Insured <input checked="" type="checkbox"/> Certified <input type="checkbox"/> COD <input type="checkbox"/> Express Mail <input type="checkbox"/> Return Receipt for Merchandise	
6. Signature - Agent X		Always obtain signature of addressee or agent and DATE DELIVERED.	
7. Date of Delivery <i>APR 4 - 28 - 92</i>		8. Addressee's Address (ONLY if requested and fee paid)	



~~Jic Section Control # 43~~  
~~Due Date 4-30-92~~  
Dairick Sarah

## LAKE STATES FORESTRY CONSULTANTS

11805 South 120th Ave.  
Hersey, Michigan 49639  
(616) 734-2841

RECEIVED

4/9/92

APR 15 1992

Mr. Richard D. Zdanowicz, Chief  
U.I.C.S.  
USEPA Region 5  
77 West Jackson Blvd.  
Chicago, IL 60604

LIC SECTION  
EPA - REGION V

RE: EPA Draft Area Permit #MI-133-3G-A002

Dear Mr. Zdanowicz,

When the Kalium Chemical Potash Project first applied for injection well permits in 1985, I was led to believe that only a small amount of water would be required to mine the potash. The salts would be evaporated and the water would be re-used for mining. Kalium manager Donald Metzger stated he had a market for the NaCl which forms a substantial portion of the solution fluid.

Given the fact that no such market exists, Kalium has had to inject the NaCl as waste into its disposal wells.

This of course greatly increases the amount of fresh potable water required.

All projections of fresh water usage were based on a recycling of the original makeup water in the solution mining process.

I would like to know: how much potable water is being drained out of the aquifer and eliminated from the hydrological cycle forever?

I would like to know if the EPA has ever considered evaluating the net worth of all the potable water that is being lost in this project. Given the widespread contamination of this nation's groundwater, is it not conceivable that the potable water being consumed by this project is more valuable than the potash being mined?

**KENNETH F. FORD**

Registered Forester & Wildlife Manager

Zdanowicz

Page 2

4/8/92

I believe Kalium knew from the start that there was no market for the NaCl byproduct and therefore deceived all interested parties by claiming their water usage would be minimal because they would recycle their mined up water.

They made this claim to avoid concern over large scale drawdown of the aquifer.

I would urge you to not issue any further permits to Kalium until they begin marketing their NaCl and recycling their water, as they led all interested parties to believe.

Sincerely,

A handwritten signature in blue ink, appearing to read "Kenneth F. Ford", is written in a cursive style.

Kenneth F. Ford



LAKE STATES  
FORESTRY CONSULTANTS

UIC # 7  
due 3-11-92

11805 South 120th Ave.  
Hersey, Michigan 49639  
(616) 734-2841

2-21-92

Mr. Richard J. Zdanowicz  
Chief, U.I.C. Section  
EPA Region 5  
77 W. Jackson BLVD.  
Chicago, IL 60604-3590

Re: Kalium Chemical, Ltd. Injection Well Permit.  
Permit Number: MI-133-3G-A002

Dear Mr. Zdanowicz,

It was recently brought to my attention that The EPA was soliciting public comments on a proposed permit for new injection wells for Kalium Chemicals.

However, when I went to the Reed City Public Library to review the Permit Application, I discovered that there was nothing there to review and that, further, the Librarian knew nothing about said Permit Application.

I then checked with our County paper, The Osceola County Herald, and they informed me that they did not publish any information regarding this matter.

As of this writing, the above Permit, MI-133-3G-A002 is still not in our library.

I would like to review this information and submit written comments if appropriate. Therefore, please either send me a copy of the Permit Application or inform me where I can review this document.

**KENNETH F. FORD**

Registered Forester & Wildlife Manager

In the meantime, I trust that your Section will not act on this request until adequate time has been allowed for public comment.

I will await to hear from you.

Sincerely,

A handwritten signature in cursive script, appearing to read "Kenneth A. Nord". The signature is written in dark ink and is positioned below the word "Sincerely,".



P. Saieh  
P 559 848 321

**RECEIPT FOR CERTIFIED MAIL**  
NO INSURANCE COVERAGE PROVIDED  
NOT FOR INTERNATIONAL MAIL  
(See Reverse) **UIC mr**

WD-17J

U.S.G.P.O. 1989-234-555  
PS Form 3800, June 1985

Sent to	Mr. Kenneth F. Ford
Street and City	Registered Forester Wildlife Manager
P.O. or other address	Lake States Forestry Consult.
Postage	11805 South 120th Street Hersey, Michigan 49639 <b>1.21</b>
Certified Fee	<b>1.00</b>
Special Delivery Fee	
Restricted Delivery Fee	
Return Receipt showing to whom and Date Delivered	<b>1.00</b>
Return Receipt showing to whom, Date, and Address of Delivery	
TOTAL Postage and Fees	\$ <b>3.21</b>
Postmark or Date	

WD-17 J - UIC mr

P. Saieh

**SENDER:** Complete items 1 and 2 when additional services are desired, and complete items 3 and 4.  
Put your address in the "RETURN TO" Space on the reverse side. Failure to do this will prevent this card from being returned to you. The return receipt fee will provide you the name of the person delivered to and the date of delivery. For additional fees the following services are available. Consult postmaster for fees and check box(es) for additional service(s) requested.

1. ☐ Show to whom delivered, date, and addressee's address. (Extra charge)  
2. ☐ Restricted Delivery (Extra charge)

3. Article Addressed to: Mr. Kenneth F. Ford Registered Forester Wildlife Manager Lake States Forestry Consultants 11805 South 120th Street Hersey, Michigan 49639	4. Article Number P 559 848 321 Type of Service: <input type="checkbox"/> Registered <input type="checkbox"/> Insured <input checked="" type="checkbox"/> Certified <input type="checkbox"/> COD <input type="checkbox"/> Express Mail <input type="checkbox"/> Return Receipt for Merchandise Always obtain signature of addressee or agent and <b>DATE DELIVERED</b> .
5. Signature - Addressee <b>X</b>	8. Addressee's Address (ONLY if requested and fee paid)
6. Signature - Agent <b>X</b> <i>Roberta Saieh</i>	
7. Date of Delivery <b>3-16-92</b>	



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION 5

77 WEST JACKSON BOULEVARD  
CHICAGO, IL 60604-3590

REPLY TO THE ATTENTION OF:

March 11, 1992

WD-17J

CERTIFIED MAIL P 559 848 321  
RETURN RECEIPT REQUESTED

Mr. Kenneth F. Ford  
Registered Forester  
Wildlife Manager  
Lake States Forestry Consultants  
11805 South 120th Street  
Hersey, Michigan 49639

Re: Public Comments on Environmental Protection Agency Draft Area Permit  
#MI-133-3G-A002

Dear Mr. Ford:

Thank you for your letter of February 21, 1992, regarding the above-referenced draft area permit.

The scope of the Federal Underground Injection Control (UIC) regulations is to determine the soundness of siting, construction and operation of injection wells as they relate to the protection of underground sources of drinking water (USDWs). A USDW is an aquifer or its portion which contains less than 10,000 mg/l of total dissolved solids. In this case, all six existing and both proposed injection wells are adequately cemented to preclude the movement of fluids into or between USDWs due to injection operations. In addition, every injection well is required to demonstrate a two part Mechanical Integrity Test (MIT). The first part of MIT requires the permittee to demonstrate the absence of significant leaks in the casing, tubing and packer. This test is accomplished by setting a temporary rubber packer above the injection zone, between the tubing and production casing. The space between the tubing and casing is pressurized for at least 30 minutes with no more than 3% pressure drop in order to satisfy the first part of Mechanical Integrity (MI). The second part of the MI requires the permittee to demonstrate the absence of fluids movement into and between USDWs by using one of the following methods; temperature, noise or oxygen activation log. A descriptive report interpreting the results of such logs shall be prepared by a knowledgeable log analyst and submitted to our office for review. The permittee will also be required to demonstrate both parts of MI every 5 years from the last approved demonstration. Under permit conditions, the injection pressure will be limited to ensure the safe operation of the wells and quarterly reports of pressures, cumulative and produced volumes will be submitted to our office for review.



In your letter you stated that a copy of the draft area permit was not available for viewing at the Reed City Public Library, Mary Redding of my staff contacted the library on February 25, 1992, and spoke with a library representative who stated that they never received the copy of the draft area permit that we sent to them. We apologize for any inconvenience we may have caused you concerning this matter.

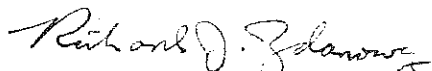
With regard to your question that the notice was not published in the Osceola County Herald, whenever a proposed permit action involves an area which encompassed a large population within the boundaries of the area and the surrounding quarter 1/4 mile, the United States Environmental Protection Agency (USEPA) attempts to publish the notice in a newspaper or newspapers whose circulation covers the area of concern. In this case, the circulation of the Cadillac Evening News covered the entire area of concern and was the most effective way to notify the public.

Based on the circumstances, we have extended the public comment period to April 9, 1992, to allow you the opportunity to raise any additional comments you may have. As of February 27, 1992, a copy of the draft area permit has been available for viewing at the Reed City Public Library. In addition, we will also publish the notice in the Osceola County Herald. If you wish to review the permit application, please submit a request under the Freedom of Information Act (FOIA). You may submit a (FOIA) request under the Section 5 U.S.C. §522, and the Privacy Act of 1974 (PA) §522(a) (enclosed). All information you request will be copied and forwarded to you in a timely manner.

In accordance with 40 Code of Federal Regulations (C.F.R.) Section 124.19, any person who files comment on the draft permit may petition the USEPA to review any condition of the final permit decision, within thirty (30) days of the service of notice of the final decision. If you wish to request an administrative review, you must submit such a request to the Office of the Administrator, Attention: Ronald L. McCallum, Chief Judicial Officer, A-101, USEPA, 401 M Street, S.W., Washington, D.C. 20460, within thirty-three (33) days of receipt of this letter. The request will be timely if received within this time period. For the request to be valid, it must conform to the requirements of 40 C.F.R. Section 124.19. A copy of these requirements is enclosed.

If you have any further questions, please contact Patrick Saieh of my staff at (312) 886-4240.

Sincerely yours,



Richard J. Zdanowicz, Chief  
Underground Injection Control Section

Enclosures

cc: R. Thomas Segall, Michigan Department of Natural Resources  
Charles Brown, The Cadmus Group

UIC Control #7  
WD-17J:P.Saieh:mr:3/4/92

mer 3/6/92

P.S. 3/6/92

W3  
3/11

W 3/6/92

W3  
3/6/92

W3  
3/9/92

FH  
3/6/92

P 366 220 448

RECEIPT FOR CERTIFIED MAIL

NO INSURANCE COVERAGE PROVIDED

Mr. Kenneth F. Ford  
Registered Forester  
Wildlife Manager  
Lake States Forestry Consultants  
11805 South 120th Street  
Hersey, MI 49639

Postage	\$ 29
Certified Fee	1.00
Special Delivery Fee	
Restricted Delivery Fee	
Return Receipt showing to whom and Date Delivered	1.00
Return Receipt showing to whom Date, and Address of Delivery	
TOTAL Postage and Fees	\$ 2.29
Postmark or Date	

PS Form 3800, June 1985

WD-17J UIC Patrick Aueh

WD-17J UIC Patrick Aueh

SENDER: Complete items 1 and 2 when additional services are desired, and complete items 3 and 4.

Put your address in the "RETURN TO" Space on the reverse side. Failure to do this will prevent this card from being returned to you. The return receipt fee will provide you the name of the person delivered to and the date of delivery. For additional fees the following services are available. Consult postmaster for fees and check box(es) for additional service(s) requested.

1. ☐ Show to whom delivered, date, and addressee's address. (Extra charge) 2. ☐ Restricted Delivery (Extra charge)

3. Article Addressed to:

Mr. Kenneth F. Ford  
Registered Forester  
Wildlife Manager  
Lake States Forestry Consultants  
11805 South 120th Street  
Hersey, MI 49639

4. Article Number

P 366 220 448

Type of Service:

- ☐ Registered ☐ Insured  
☒ Certified ☐ COD  
☐ Express Mail ☐ Return Receipt for Merchandise

Always obtain signature of addressee or agent and DATE DELIVERED.

5. Signature - Addressee

X

6. Signature - Agent

X

7. Date of Delivery

4-22-92

8. Addressee's Address (ONLY if requested and fee paid)

PS Form 3811, Apr. 1989

★ U.S.G.P.O. 1989-238-815

DOMESTIC RETURN RECEIPT

APR 20 1992

WD-17J

CERTIFIED MAIL P 366 220 448  
RETURN RECEIPT REQUESTED

Mr. Kenneth F. Ford  
Registered Forester  
Wildlife Manager  
Lake States Forestry Consultants  
11805 South 120th Street  
Hersey, Michigan 49639

Re: Underground Injection Control (UIC) Permit #MI-133-3G-A002 (Hersey Potash Facility).

Dear Mr. Ford:

This letter is to inform you that the UIC Section of the United States Environmental Protection Agency has issued a final permit to Kalium Chemicals, Ltd. for the above-referenced facility. Should you wish to appeal this final permit decision, you must follow the procedures outlined in the letter which was sent to you on March 11, 1992.

Should you have any questions, feel free to contact me at (312) 886-4240.

Sincerely yours,

Patrick Saieh, Permit Writer  
Permit Unit, UIC Section

WD-17J:P.Saieh:fh:4/15/92  
Patrick's Disk #9  
Document Name: Ford

*rec'd 4/16/92*

*FH 4/15/92*

*P.S. 4/15/92*

*4/15*

P 366 220 449  
**RECEIPT FOR CERTIFIED MAIL**

NO INSURANCE COVERAGE PROVIDED  
 NOT FOR INTERNATIONAL MAIL  
 (See Reverse)

U.S.G.P.O. 1989-234-555

PS Form 3800, June 1985

Se	Mr. Marco S. Menezes	
Str	Attorney at Law	
P.O.	P.O. Box 289	
	Hersey, MI 49639	
Postage	\$	29
Certified Fee		1.00
Special Delivery Fee		
Restricted Delivery Fee		
Return Receipt showing to whom and Date Delivered		1.00
Return Receipt showing to whom, Date, and Address of Delivery		
TOTAL Postage and Fees	\$	2.29
Postmark or Date		

Patrick Suek  
 WD-195 UIC

WD-195 UIC Patrick Suek

**SENDER:** Complete items 1 and 2 when additional services are desired, and complete items 3 and 4.  
 Put your address in the "RETURN TO" Space on the reverse side. Failure to do this will prevent this card from being returned to you. The return receipt fee will provide you the name of the person delivered to and the date of delivery. For additional fees the following services are available. Consult postmaster for fees and check box(es) for additional service(s) requested.

1. ☐ Show to whom delivered, date, and addressee's address. (Extra charge) 2. ☐ Restricted Delivery (Extra charge)

3. Article Addressed to:  Mr. Marco S. Menezes Attorney at Law P.O. Box 289 Hersey, MI 49639	4. Article Number P 366 220 449 Type of Service: <input type="checkbox"/> Registered <input type="checkbox"/> Insured <input checked="" type="checkbox"/> Certified <input type="checkbox"/> COD <input type="checkbox"/> Express Mail <input type="checkbox"/> Return Receipt for Merchandise
5. Signature — Addressee X <i>Marco S. Menezes</i>	8. Addressee's Address (ONLY if requested and fee paid)
6. Signature — Agent X	
7. Date of Delivery 4-24-92	

PS Form 3811, Apr. 1989 ★ U.S.G.P.O. 1989-238-815 DOMESTIC RETURN RECEIPT



APR 20 1992

WD-17J

CERTIFIED MAIL P 366 220 449  
RETURN RECEIPT REQUESTED

Mr. Marco S. Menezes  
Attorney at Law  
P.O. Box 289  
Hersey, Michigan 49639

Re: Underground Injection Control (UIC) Permit #MI-133-3G-A002 (Hersey Potash Facility).

Dear Mr. Menezes:

This letter is to inform you that the UIC Section of the United States Environmental Protection Agency has issued a final permit to Kalium Chemicals, Ltd. for the above-referenced facility. Should you wish to appeal this final permit decision, you must follow the procedures outlined in the letter which was sent to you on March 10, 1992.

Should you have any questions, feel free to contact me at (312) 886-4240.

Sincerely yours,

Patrick Saieh, Permit Writer  
Permit Unit, UIC Section

WD-17J:P.Saieh:fh:4/15/92  
Patrick's Disk #9  
Document Name: Menezes

*208*  
*4/16/92*

*P.S. 4/15/92*

*FH*  
*4/15/92*

*4/15*

P 366 220 450  
**RECEIPT FOR CERTIFIED MAIL**  
 NO INSURANCE COVERAGE PROVIDED  
 NOT FOR INTERNATIONAL MAIL

U.S.G.P.O. 1989-234-555

PS Form 3800, June 1985

Mr. David A. Jacobs  
 Science Department Chair  
 Ewart High School  
 321 North Hemlock  
 Ewart, MI 49631

Postage	\$ 29
Certified Fee	1.00
Special Delivery Fee	
Restricted Delivery Fee	
Return Receipt showing to whom and Date Delivered	1.00
Return Receipt showing to whom, Date, and Address of Delivery	
TOTAL Postage and Fees	\$ 2.29
Postmark or Date	

WD-17J UIC Patrick Saick

WD-17J UIC Patrick Saick

**SENDER:** Complete items 1 and 2 when additional services are desired, and complete items 3 and 4.

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1. ☐ Show to whom delivered, date, and addressee's address. (Extra charge) 2. ☐ Restricted Delivery (Extra charge)

3. Article Addressed to:

Mr. David A. Jacobs  
 Science Department Chair  
 Ewart High School  
 321 North Hemlock  
 Ewart, MI 49631

4. Article Number

P 366 220 450

Type of Service:

- ☒ Registered ☐ Insured  
☒ Certified ☐ COD  
☐ Express Mail ☐ Return Receipt for Merchandise

Always obtain signature of addressee or agent and DATE DELIVERED.

5. Signature — Addressee

X

6. Signature — Agent

\*Mark Carmichael

7. Date of Delivery

4-22-92

8. Addressee's Address (ONLY if requested and fee paid)

PS Form 3811, Apr. 1989

★ U.S.G.P.O. 1989-238-815

DOMESTIC RETURN RECEIPT

APR 20 1992

WD-17J

CERTIFIED MAIL P 366 220 450  
RETURN RECEIPT REQUESTED

Mr. David A. Jacobs  
Science Department Chair  
Ewart High School  
321 North Hemlock  
Ewart, Michigan 49631

Re: Underground Injection Control (UIC) Permit #MI-133-3G-A002 (Hersey Potash Facility).

Dear Mr. Jacobs:

This letter is to inform you that the UIC Section of the United States Environmental Protection Agency has issued a final permit to Kalium Chemicals, Ltd. for the above-referenced facility. Should you wish to appeal this final permit decision, you must follow the procedures outlined in the letter which was sent to you on March 10, 1992.

Should you have any questions, feel free to contact me at (312) 886-4240.

Sincerely yours,

Patrick Saieh, Permit Writer  
Permit Unit, UIC Section

WD-17J:P.Saieh:fh:4/15/92  
Patrick's Disk #9  
Document Name: Jacobs

RLH  
4/16/92

P.S. 4/15/92

FH  
4/15/92

RLH  
4/15



P 366 220 451

## RECEIPT FOR CERTIFIED MAIL

NO INSURANCE COVERAGE PROVIDED  
NOT FOR INTERNATIONAL MAIL  
(See Reverse)

\*U.S.G.P.O. 1989-234-555

PS Form 3800, June 1985

Mr. Rich Jacobs  
5393 West Two Mile Road  
Hersey, MI 49639

Postage	\$ 29
Certified Fee	1.00
Special Delivery Fee	
Restricted Delivery Fee	
Return Receipt showing to whom and Date Delivered	1.00
Return Receipt showing to whom, Date, and Address of Delivery	
TOTAL Postage and Fees	\$ 2.29
Postmark or Date	

Patrick Jacob  
WD-17J UIC

WD-17J UIC Patrick Jacob

SENDER: Complete items 1 and 2 when additional services are desired, and complete items 3 and 4.

Put your address in the "RETURN TO" Space on the reverse side. Failure to do this will prevent this card from being returned to you. The return receipt fee will provide you the name of the person delivered to and the date of delivery. For additional fees the following services are available. Consult postmaster for fees and check box(es) for additional service(s) requested.

1. ☐ Show to whom delivered, date, and addressee's address. (Extra charge) 2. ☐ Restricted Delivery (Extra charge)

3. Article Addressed to:

Mr. Rich Jacobs  
5393 West Two Mile Road  
Hersey, MI 49639

4. Article Number

P 366 220 451

Type of Service:

- ☐ Registered ☐ Insured  
☒ Certified ☐ COD  
☐ Express Mail ☐ Return Receipt for Merchandise

Always obtain signature of addressee or agent and DATE DELIVERED.

5. Signature of Addressee

X *Richard A. Jacob*

6. Signature — Agent

X

7. Date of Delivery

4-27-92

8. Addressee's Address (ONLY if requested and fee paid)

PS Form 3811, Apr. 1989

\*U.S.G.P.O. 1989-238-815

DOMESTIC RETURN RECEIPT

APR 20 1992

WD-17J

CERTIFIED MAIL P 366 220 451  
RETURN RECEIPT REQUESTED

Mr. Rich Jacobs  
5393 West Two Mile Road  
Hersey, Michigan 49639

Re: Underground Injection Control (UIC) Permit #MI-133-3G-A002 (Hersey Potash Facility).

Dear Mr. Jacobs:

This letter is to inform you that the UIC Section of the United States Environmental Protection Agency has issued a final permit to Kalium Chemicals, Ltd. for the above-referenced facility. Should you wish to appeal this final permit decision, you must follow the procedures outlined in the letter which was sent to you on March 10, 1992.

Should you have any questions, feel free to contact me at (312) 886-4240.

Sincerely yours,

Patrick Saieh, Permit Writer  
Permit Unit, UIC Section

WD-17J:P.Saieh:fh:4/15/92  
Patrick's Disk #9  
Document Name: Rich

PSH  
4/16/92

AW 4/15

FH  
4/15/92

P.S. 4/15/92

P 874 011 127



# Certified Mail Receipt

No Insurance Coverage Provided  
Do not use for International Mail  
(See Reverse)

Sent to	
Ms. Debra Bloom Vance	
4632 Hersey Road	
Hersey, MI 49639	
Postage	\$ 29
Certified Fee	1.00
Special Delivery Fee	
Restricted Delivery Fee	
Return Receipt Showing to Whom's Date Delivered	1.00
Return Receipt Showing to Whom's Date, & Address of Delivery	
TOTAL Postage & Fees	\$ 2.29
Postmark or Date	

PS Form 3800, June 1990

WD-175 UIC Patrick Saich

WD-175 UIC Patrick Saich

**SENDER:** Complete items 1 and 2 when additional services are desired, and complete items 3 and 4.  
Put your address in the "RETURN TO" Space on the reverse side. Failure to do this will prevent this card from being returned to you. The return receipt fee will provide you the name of the person delivered to and the date of delivery. For additional fees the following services are available. Consult postmaster for fees and check box(es) for additional service(s) requested.

1. ☐ Show to whom delivered, date, and addressee's address. (Extra charge) 2. ☐ Restricted Delivery (Extra charge)

3. Article Addressed to:  Ms. Debra Bloom Vance 4632 Hersey Road Hersey, MI 49639	4. Article Number P 874 011 127
5. Signature — Addressee X	Type of Service: <input type="checkbox"/> Registered <input type="checkbox"/> Insured <input checked="" type="checkbox"/> Certified <input type="checkbox"/> COD <input type="checkbox"/> Express Mail <input type="checkbox"/> Return Receipt for Merchandise
6. Signature — Agent X <i>Don Vance</i>	Always obtain signature of addressee or agent and <b>DATE DELIVERED</b> .
7. Date of Delivery 4-24-92	8. Addressee's Address (ONLY if requested and fee paid)

PS Form 3811, Apr. 1989      ★ U.S.G.P.O. 1989-238-815      DOMESTIC RETURN RECEIPT

APR 20 1992

WD-17J

CERTIFIED MAIL P 874 011 127  
RETURN RECEIPT REQUESTED

Ms. Debra Bloom Vance  
4632 Hersey Road  
Hersey, Michigan 49639

Re: Underground Injection Control (UIC) Permit #MI-133-3G-A002 (Hersey Potash Facility).

Dear Ms. Vance:

This letter is to inform you that the UIC Section of the United States Environmental Protection Agency has issued a final permit to Kalium Chemicals, Ltd. for the above-referenced facility. Should you wish to appeal this final permit decision, you must follow the procedures outlined in the letter which was sent to you on March 10, 1992.

Should you have any questions, feel free to contact me at (312) 886-4240.

Sincerely yours,

Patrick Saieh, Permit Writer  
Permit Unit, UIC Section

WD-17J:P.Saieh:fh:4/15/92  
Patrick's Disk #9  
Document Name: Vance

*PCH  
4/16/92*

*P.S. 4/15/92*

*FW 4/15*

*FH  
4/15/92*



2110 Contial # 36

due 4-21 12

Patrick Satch

April 2, 1992

Dear Sir,

We live within a few miles of The Kalium Chemicals plant and have had concerns from the beginning, concerning the quality of our ground water and air. Now we are told Kalium is seeking to renew its area permit and to drill two new wells. This poses some questions which residents will want answers to and a public hearing would enable us to address our concerns. Such as:

- A. What Types of wells will These be (Mining - Fresh water - Disposal?)
- B. Why is Kalium requesting a permit for an area 12 times larger than Their original permit?
- C. How can we be assured that The amount of fresh water The plant will require, once additional wells are put in, won't affect our water wells?
- D. What can we expect in The way of precautionary measures to contain and safeguard against Hydrogen Sulfide emissions from an expanded mining operation?
- E. What Types of Monitoring reports will be required, etc.? And will These reports be available to The public - and how will They be made available?

Concerned property owners and  
Residents of Osceola County  
William E. Strong  
Chie H. Strong

WD-17J-UIC mr Patrick Saieh

SENDER: Complete items 1 and 2 when additional services are desired, and complete items 3 and 4.  
Put your address in the "RETURN TO" Space on the reverse side. Failure to do this will prevent this card from being returned to you. The return receipt fee will provide you the name of the person delivered to and the date of delivery. For additional fees the following services are available. Consult postmaster for fees and (check boxes) for additional service(s) requested.  
1. ☐ Show to whom delivered, date, and addressee's address. 2. ☐ Restricted Delivery (Extra charge)

3. Article Addressed to: <b>Mr. &amp; Mrs. William Strang</b> <b>P.O. Box 158</b> <b>Hersey, Michigan 49677</b>	4. Article Number <b>P 559 848 206</b>
Type of Service: <input type="checkbox"/> Registered <input checked="" type="checkbox"/> Certified <input type="checkbox"/> Express Mail <input type="checkbox"/> Insured <input type="checkbox"/> COD <input type="checkbox"/> Return Receipt for Merchandise Always obtain signature of addressee or agent and DATE DELIVERED.	
5. Signature - Addressee <i>William Strang</i>	8. Addressee's Address (ONLY if requested and fee paid)
6. Signature - Agent <i>X</i>	
7. Date of Delivery <b>4-27-92</b>	

PS Form 3811, Apr. 1989 \*U.S.G.P.O. 1989-238-815 DOMESTIC RETURN RECEIPT



Patrick Saieh  
P 559 848 206  
RECEIPT FOR CERTIFIED MAIL  
NO INSURANCE COVERAGE PROVIDED  
NOT FOR INTERNATIONAL MAIL  
WD-17J UIC mr (See Reverse)

Mail to <b>Mr. &amp; Mrs. William Strang</b>	
Street and No. <b>P.O. Box 158</b>	
P.O., State and ZIP Code <b>Hersey, Michigan 49677</b>	
Postage	<b>1.21</b>
Certified Fee	<b>1.00</b>
Special Delivery Fee	
Restricted Delivery Fee	
Return Receipt showing to whom and Date Delivered	<b>1.00</b>
Return Receipt showing to whom, Date, and Address of Delivery	
TOTAL Postage and Fees	<b>\$ 3.21</b>
Postmark or Date	

PS Form 3800, June 1985

\*U.S.G.P.O. 1989-234-555

*Mr. & Mrs. Wm. Strang*  
*P.O. Box 158*  
*Hersey, MI 49639*

*Richard J. Zdanowicz, Chief*  
*Underground Injection Control/Section*  
*U.S.E.P.A., Region V*  
*77 West Jackson Blvd.*  
*Chicago, IL 60604*

WD-17J

APR 15 1992

CERTIFIED MAIL P 559 848 206  
RETURN RECEIPT REQUESTED

Mr. & Mrs. William Strang  
P.O. Box 158  
Hersey, Michigan 49639

Re: Public Comments on the United States Environmental Protection Agency  
(USEPA) Draft Area Permit #MI-133-3G-A002

Dear Mr. & Mrs. Strang:

Thank you for your letter regarding the above-referenced draft area permit.

The scope of the Federal Underground Injection Control (UIC) regulations is to determine the soundness of siting, construction and operation of injection wells as they relate to the protection of underground sources of drinking water (USDWs). A USDW is an aquifer or its portion which contains less than 10,000 mg/l of total dissolved solids. In this case, all six existing and both proposed injection wells are adequately cemented to preclude the movement of fluids into or between USDWs due to injection operations. In addition, every injection well is required to demonstrate a two part Mechanical Integrity Test (MIT). The first part of MIT requires the permittee to demonstrate the absence of significant leaks in the casing, tubing and packer. This test is accomplished by setting a temporary rubber packer above the injection zone, between the tubing and production casing. The space between the tubing and casing is pressurized for at least 30 minutes with no more than 3% pressure drop in order to satisfy the first part of Mechanical Integrity (MI). The second part of the MI requires the permittee to demonstrate the absence of fluids movement into and between USDWs by using one of the following methods; temperature, noise or oxygen activation log. A descriptive report interpreting the results of such logs shall be prepared by a knowledgeable log analyst and submitted to our office for review. The permittee will also be required to demonstrate both parts of MI every 5 years from the last approved demonstration. Under permit conditions, the injection pressure will be limited to ensure the safe operation of the wells and quarterly reports of pressures, cumulative and produced volumes will be submitted to our office for review.



In your letter, you have expressed concerns over the quality of your ground-water due to injection well mining operations. As stated in the previous paragraph, all existing and all proposed wells are constructed and operated in such a manner so as to confine the injected fluid to the permitted interval and prevent the migration of any fluids into or between USDWs.

The proposed area permit is for Class III solution mining wells. Class III injection wells are wells which inject fluids for extraction of minerals such as solution mining of potash.

Kalium Chemicals, Ltd. is seeking an area permit which is about twelve times bigger than their existing area permit so that they will have more area to cover during the testing of potash. However, please be advised that under our current UIC regulations, there are no provisions which will allow the USEPA to limit the size of an area permit.

Kalium Chemicals, Ltd. will, before the expansion of the area project, perform hydrogeologic tests to determine that the amount of fresh water that will be used will not adversely affect the existing groundwater supplies of local residents. However, since the UIC section of the USEPA regulates only injection wells activities, we feel that perhaps your question regarding water wells should be addressed more fully by contacting: Mr. Mike Ulrich, Osceola County Department of Public Health, 115 North Sears, Reed City, Michigan 49677.

The UIC section of the USEPA only regulates injection well operations. As your question regarding the safeguards against hydrogen sulfide comes under the purview of the Michigan Department of Natural Resources (MDNR), we feel that your question regarding this matter could be addressed more fully by contacting: Mr. Larry Schultz, Environmental Engineer, Air Quality Division, Cadillac District Officer, MDNR, 8015 South Machinaw Trail, Cadillac, Michigan 49601.

Kalium Chemicals, Ltd. will be required to observe and record injection pressure semi-monthly and shall report this to the USEPA on a quarterly basis. The cumulative injected and produced volume shall be monitored daily and shall be reported quarterly. The specific gravity shall be monitored monthly and shall be reported quarterly. A copy of the draft permit, containing the USEPA monitoring requirements, is available for viewing at the Reed City Public Library, 410 West Upton, Reed City, Michigan. All monitoring data submitted by Kalium Chemicals, Ltd. is contained in the administrative record for this permit, and is available for viewing at 77 West Jackson Boulevard, Chicago, Illinois 60604-3590, between the hours of 9 a.m. to 4 p.m. You may also submit a Freedom of Information Act (FOIA) request under the Section 5 U.S.C. §522, and the Privacy Act of 1974 (PA) 5 U.S.C. §522(a) (enclosed).



The extension of the public comment period began on February 29, 1992, and ended on March 29, 1992. Your letter was received on April 7, 1992, which was after the close of the public comment extension period. Since the injection operations proposed by Kalium Chemicals, Ltd. meet all Federal UIC requirements for environmental protection, the USEPA will issue a final permit for this project, and feels that a public hearing is not warranted.

If you have any further questions, please contact Patrick Saieh of my staff at (312) 886-4240.

Sincerely yours,

Richard J. Zdanowicz, Chief  
Underground Injection Control Section

Enclosures

cc: Mike Ulrich  
Osceola County Department of Public Health  
115 North Sears  
Reed City, Michigan 49677

Mr. Larry Schultz  
Environmental Engineer  
Air Quality Division  
Cadillac District Officer  
Michigan Department of Natural Resources  
8015 South Machinaw Trail  
Cadillac, Michigan 49601.

UIC Control #36  
WD-17J:P.Saieh:mr:4/8/92

P.S. 4/9/92

APR 15/92

4/14

4/15/92

FH  
4/9/92

4/15

4/1

UIC Section Control # 34 Patrick Saieh  
Do Date 4-17-92  
Please have a public hearing in regard to this matter  
William C. Anderson

QUESTIONS FOR KALIUM RE: PERMIT APPLICATION

- 1) If a new area permit is issued, how long will it remain in effect?
- 2) How many new wells are proposed to be drilled over the permit period?
- 3) What types of wells are these? Mining? Fresh Water? Disposal?
- 4) Where will each of the proposed wells be located?
- 5) Why is a permit for an area 12 times larger than the original permit area now being sought?
- 6) What plans for expansion does Kalium foresee over the period of the new permit that requires a permit area of this size?
- 7) Will these plans require more fresh water than is currently being used? If so, how much?
- 8) Are new mining clusters contemplated within the expanded permit area?
- 9) If so, where will these new clusters be located and what is Kalium's timetable for putting them into production.
- 10) Will additional permits also be required from the M.D.N.R.?
- 11) If so, what types of permits are required and have these been applied for? Issued?
- 12) What precautionary measures are planned to contain and safeguard against Hydrogen Sulfide (sour gas) emissions from an expanded mining operation?
- 13) Are process fluids currently monitored for the presence of radionuclides (radio-active elements)? If so, what has been detected to date? If not, is such monitoring contemplated in the future?
- 14) What types of monitoring reports will be required? By whom? With what frequency?
- 15) Will monitoring reports be made available to the general public without recourse to the Freedom of Information Acts? If so, how will these be made available? If not, why not?

RECEIVED

APR 2 1992

UIC SECTION  
EPA - REGION V



WD-17J

PS Form 3800, June 1990

**Certified Mail Receipt**

No Insurance Coverage Provided  
Do not use for International Mail  
(See Reverse) UIC mr

Sent to	
Mr. William C. Andresen	
Street & No.	
331 West Slosson Avenue	
P.O., State & ZIP Code	
Reed City, MI 49677	
Postage	\$ .52
Certified Fee	1.00
Special Delivery Fee	
Restricted Delivery Fee	
Return Receipt Showing to Whom & Date Delivered	1.00
Return Receipt Showing to Whom, Date, & Address of Delivery	
TOTAL Postage & Fees	\$ 2.52
Postmark or Date	

Patrick Saieh

P 864 124 824

WD-17J-UIC mr

Patrick Saieh

SENDER: Complete items 1 and 2 when additional services are desired, and complete items 3 and 4.

Put your address in the "RETURN TO" Space on the reverse side. Failure to do this will prevent this card from being returned to you. The return receipt fee will provide you the name of the person delivered to and the date of delivery. For additional fees the following services are available. Consult postmaster for fees and check box(es) for additional service(s) requested.

1. ☐ Show to whom delivered, date, and addressee's address. 2. ☐ Restricted Delivery (Extra charge)

3. Article Addressed to:

Mr. William C. Andresen  
331 West Slosson Avenue  
Reed City, Michigan 49677

4. Article Number

P 559 848 331

Type of Service:

☒ Registered ☐ Insured  
☒ Certified ☐ COD  
☐ Express Mail ☐ Return Receipt for Merchandise

Always obtain signature of addressee or agent and DATE DELIVERED.

8. Addressee's Address (ONLY if requested and fee paid)

5. Signature — Addressee

X

6. Signature — Agent

X

7. Date of Delivery

4-23-92

PS Form 3811, Apr. 1989

\*U.S.G.P.O. 1989-230-915

DOMESTIC RETURN RECEIPT

Mr. William C. Andresen  
336 W Slosson Ave.  
Reed City, MI 49677



Richard S. Zdanowicz  
Unsubscribed Inspection Control-See,  
U.S. EPA, Region V  
77 West Jackson Blvd,  
Chicago, Ill. 60604

WD-17J

APR 10 1992

**CERTIFIED MAIL P 559 848 331**  
**RETURN RECEIPT REQUESTED**

Mr. William C. Andresen  
336 West Slosson Avenue  
Reed City, Michigan 49677

**Re: Public Comments on the United States Environmental Protection Agency  
(USEPA) Draft Area Permit #MI-133-3G-A002**

Dear Mr. Andresen:

Thank you for your letter regarding the above-referenced draft area permit.

The scope of the Federal Underground Injection Control (UIC) regulations is to determine the soundness of siting, construction and operation of injection wells as they relate to the protection of underground sources of drinking water (USDWs). A USDW is an aquifer or its portion which contains less than 10,000 mg/l of total dissolved solids. In this case, all six existing and both proposed injection wells are adequately cemented to preclude the movement of fluids into or between USDWs due to injection operations. In addition, every injection well is required to demonstrate a two part Mechanical Integrity Test (MIT). The first part of MIT requires the permittee to demonstrate the absence of significant leaks in the casing, tubing and packer. This test is accomplished by setting a temporary rubber packer above the injection zone, between the tubing and production casing. The space between the tubing and casing is pressurized for at least 30 minutes with no more than 3% pressure drop in order to satisfy the first part of Mechanical Integrity (MI). The second part of the MI requires the permittee to demonstrate the absence of fluids movement into and between USDWs by using one of the following methods; temperature, noise or oxygen activation log. A descriptive report interpreting the results of such logs shall be prepared by a knowledgeable log analyst and submitted to our office for review. The permittee will also be required to demonstrate both parts of MI every 5 years from the last approved demonstration. Under permit conditions, the injection pressure will be limited to ensure the safe operation of the wells and quarterly reports of pressures, cumulative and produced volumes will be submitted to our office for review.



The following are our responses to the questions raised in your letter in the same sequential order as your questions.

**Response #1** - In accordance with 40 C.F.R. §144.36 (enclosed), all UIC permits for Class III wells will be issued for a period up to the operating life of the facility. However, the permit will be reviewed every 5 years from the effective date of the final issued permit.

**Response #2** - In accordance with 40 C.F.R. §144.33 (enclosed), an applicant for a UIC permit may request a permit for an area rather than for each well individually provided that the proposed injection wells are constructed in a similar fashion as the existing injection wells. Although only two proposed wells will be converted at this time, the purpose of an area permit is to allow the applicant flexibility to construct, operate, convert or plug and abandon wells within the permitted area without having to apply for each proposed action individually. The exact number of wells to be drilled is not known at this time.

**Response #3** - The proposed area permit is for Class III solution mining wells. Class III injection wells are wells which inject fluids for extraction of minerals such as solution mining of potash.

**Response #4** - The location of each proposed well is not known at this time, however, the purpose of an area permit is to allow Kalium Chemicals, Ltd. the flexibility to drill new wells anywhere within the permitted area, provided that Kalium Chemicals, Ltd. notifies the USEPA and complies with all permit conditions, including construction and mechanical integrity testing requirements.

**Response #5** - Kalium Chemicals, Ltd. is seeking an area permit which is about twelve times bigger than their existing area permit so that they will have more area to cover during the testing of potash. However, please be advised that under our current UIC regulations, there are no provisions which will allow the USEPA to limit the size of an area permit.

**Response #6** - At this time, Kalium Chemicals, Ltd. does not have any specific plan to expand their existing mining operations. Kalium Chemicals, Ltd. is proposing to expand their existing area permit so that when their existing cluster of wells no longer produce potash in an amount sufficient to be commercially feasible, Kalium Chemicals, Ltd. will have the option to drill new wells within the expanded area with no need to reapply for a USEPA permit. Mr. Rob Plosz from Kalium Chemicals, Ltd. stated during a phone conversation with Patrick Saieh of my staff that Kalium Chemicals, Ltd. has decided to apply for an area permit of this size so that they will have more area to cover during the testing of potash.

**Response #7** - Kalium's mining process involves pumping fresh water through boreholes in potash beds 7500 feet below the surface, dissolving the potash-bearing portion of the ores and returning the solution to surface for refining. As Kalium Chemicals, Ltd. is proposing to expand their existing operations, more fresh water than what is currently being used will be needed. Because this is a proposed project the estimated amount of fresh water has not yet been determined.

Response #8 - At this time, Kalium Chemicals, Ltd. does not have specific plan to construct any new clusters. However, once the need arises, Kalium Chemicals, Ltd. will begin conducting tests within the permitted area to determine the best location for construction of new wells.

Response #9 - The location of the new clusters is not known at this time, however, Kalium Chemicals, Ltd. may construct, operate, convert or plug and abandon wells anywhere within the permitted area, provided that all permit requirements are met. The permit does not restrict Kalium Chemicals, Ltd. to a specific timetable to when they can start production.

Response #10 - In addition to the USEPA area permit, Kalium Chemicals, Ltd. is also required to apply to the Michigan Department of Natural Resources (MDNR) for permits and must receive an individual State permit before commencing the drilling of any new solution mining well.

Response #11 - Currently, there are six existing and two proposed Class III solution mining of potash injection wells listed under the proposed area permit. The six existing solution mining wells have already been permitted by MDNR, and the two proposed wells have not yet received permits from MDNR.

Response #12 - The UIC section of the USEPA only regulates injection wells operations. As your question regarding the safeguards against hydrogen sulfide comes under the purview of the MDNR, we feel that your question regarding this matter could be addressed more fully by contacting: Mr. Larry Schultz, Environmental Engineer, Air Quality Division, Cadillac District Office, MDNR, 8015 South Machinaw Trail, Cadillac, Michigan 49601.

Response #13 - Kalium Chemicals, Ltd. does not chemically analyze process fluids specifically for radioactive elements. Potassium chloride (potash) has a naturally occurring radioactive isotope ( $^{40}\text{K}$ ). Kalium Chemicals, Ltd. uses a well logging tool capable of measuring extremely low levels of this isotope. Any other radioactive element in the brines would be readily detected by this tool if present. To date Kalium Chemicals, Ltd. has not detected anything other than the normal potash  $^{40}\text{K}$  isotope.

Response #14 - Kalium Chemicals, Ltd. will be required to observe and record injection pressure semi-monthly and shall report this to the USEPA on a quarterly basis. The cumulative injected and produced volume shall be monitored daily and shall be reported quarterly. The specific gravity shall be monitored monthly and shall be reported quarterly. A copy of the draft permit, containing the USEPA monitoring requirements, is available for viewing at the Reed City Public Library, 410 West Upton, Reed City, Michigan.

Response #15 - All monitoring data submitted by the applicant is contained in the administrative record for this permit, and is available for viewing at 77 West Jackson Boulevard, Chicago, Illinois 60604-3590, between the hours of 9 a.m. to 4 p.m.



The extension of the public comment period began on February 29, 1992, and ended on March 29, 1992. Your letter was received on April 2, 1992, which was after the close of the public comment extension period. Since the injection operations proposed by Kalium Chemicals, Ltd. meet all Federal UIC requirements for environmental protection, the USEPA will issue a final permit for this project, and feels that a public hearing is not warranted.

If you have any further questions, please contact Patrick Saieh of my staff at (312) 886-4240.

Sincerely yours,

Richard J. Zdanowicz, Chief  
Underground Injection Control Section

Enclosures

cc: Larry Schultz  
Environmental Engineer  
Air Quality Division  
Cadillac District Office  
Michigan Department of Natural Resource  
8015 South Machinaw Trail  
Cadillac, Michigan 49601

UIC Control #34  
WD-17J:P.Saieh:mr:4/3/92

RUH  
FOR  
RSZ  
4/10/92

RUH  
4/10/92

RW 4/10

FH  
4/9/92

U.S. Postal Service  
**CERTIFIED MAIL RECEIPT**  
 (Domestic Mail Only; No Insurance Coverage Provided)

7001 0320 0005 8923 5045

**OFFICIAL USE**

Postage	\$ 46
Certified Fee	310
Return Receipt Fee (Endorsement Required)	255
Restricted Delivery Fee (Endorsement Required)	
<b>Total Postage &amp; Fees</b>	<b>\$ 6.11</b>

Postmark: CHICAGO, IL

Sent To: Douglas Potalski / Mosaic Potash Hersey  
 Street, Apt., P.O. Box, or PO Box No. 1395 135th Avenue  
 City, State, ZIP+4 Hersey, MI 49639

PS Form 3800, January 2001 See Reverse for Instructions

WD-16J (UIC) P. Laich (ATI) MT-133-3G-A602

<b>SENDER: COMPLETE THIS SECTION</b> <ul style="list-style-type: none"> <li>Complete items 1, 2, and 3. Also complete item 4 if Restricted Delivery is desired.</li> <li>Print your name and address on the reverse so that we can return the card to you.</li> <li>Attach this card to the back of the mailpiece, or on the front if space permits.</li> </ul>	<b>COMPLETE THIS SECTION ON DELIVERY</b> <p>A. Signature  <input checked="" type="checkbox"/> Leslie Hicks <input type="checkbox"/> Agent <input type="checkbox"/> Addressee</p> <p>B. Received by (Printed Name)        Leslie Hicks</p> <p>C. Date of Delivery        7-26</p> <p>D. Is delivery address different from item 1? <input type="checkbox"/> Yes        If YES, enter delivery address below: <input type="checkbox"/> No</p>
1. Article Addressed to: Mr. Douglas M. Potalski Mosaic Potash Hersey 1395 135th Avenue Hersey, MI 49639	3. Service Type <input checked="" type="checkbox"/> Certified Mail <input type="checkbox"/> Express Mail <input type="checkbox"/> Registered <input type="checkbox"/> Return Receipt for Merchandise <input type="checkbox"/> Insured Mail <input type="checkbox"/> C.O.D.
2. Article Number (Transfer from service label)	4. Restricted Delivery? (Extra Fee) <input type="checkbox"/> Yes

7001 0320 0005 8923 5045

PS Form 3811, February 2004 Domestic Return Receipt 102595-02-M-1540





UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
REGION 5  
77 WEST JACKSON BOULEVARD  
CHICAGO, IL 60604-3590

JUL 19 2013

REPLY TO THE ATTENTION OF:  
**WU-16J**

**CERTIFIED MAIL 7001 0320 0005 8923 5045**  
**RETURN RECEIPT REQUESTED**

Mr. Douglas M. Patulski  
Mosaic Potash Hersey, LLC  
1395 135th Avenue  
Hersey, Michigan 49639

**Re: Authorization to Inject into the Following Well:**

**Well #1014, Michigan Department of Environmental Quality (MDEQ) Permit  
M403; U. S. Environmental Protection Agency Permit Number MI-133-3G-A002  
in Osceola County, Michigan**

Dear Mr. Patulski:

The results of the mechanical integrity demonstration for the well referenced above have been reviewed and have been found to be satisfactory. In accordance with permit conditions, Mosaic Potash Hersey, LLC of Hersey, Michigan is authorized to recommence injection into the well referenced above.

Should you have any questions regarding the above information, feel free to contact Patrick Saieh at (312) 886-4240.

Sincerely yours,

*[Signature]* 7/19/13  
Rebecca L. Harvey, Chief

*[Signature]*  
Underground Injection Control Branch

*[Signature]* 7/18/13  
*[Signature]* 7/19/13  
*[Signature]* 7/18/13  
P.S. 7/18/13  
*[Signature]* 7/18/13



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
REGION 5  
77 WEST JACKSON BOULEVARD  
CHICAGO, IL 60604-3590

JUL 19 2013

REPLY TO THE ATTENTION OF:  
WU-16J

**CERTIFIED MAIL 7001 0320 0005 8923 5045**  
**RETURN RECEIPT REQUESTED**

Mr. Douglas M. Patulski  
Mosaic Potash Hersey, LLC  
1395 135th Avenue  
Hersey, Michigan 49639

**Re: Authorization to Inject into the Following Well:**

**Well #1014, Michigan Department of Environmental Quality (MDEQ) Permit  
M403; U. S. Environmental Protection Agency Permit Number MI-133-3G-A002  
in Osceola County, Michigan**

Dear Mr. Patulski:

The results of the mechanical integrity demonstration for the well referenced above have been reviewed and have been found to be satisfactory. In accordance with permit conditions, Mosaic Potash Hersey, LLC of Hersey, Michigan is authorized to recommence injection into the well referenced above.

Should you have any questions regarding the above information, feel free to contact Patrick Saieh at (312) 886-4240.

Sincerely yours,

A handwritten signature in black ink, appearing to read "Rebecca L. Harvey".

Rebecca L. Harvey, Chief  
Underground Injection Control Branch



Mosaic Potash Hersey  
1395 135<sup>th</sup> Avenue  
Hersey, MI 49639  
www.mosaicco.com

Tel 231-832-8800  
Fax 231-832-3349

*Patrick*

July 12<sup>th</sup>, 2013

Lisa Perenchio, Chief  
Underground Injection Control Branch  
United States Environmental Protection Agency  
77 W. Jackson Blvd, WU-16J  
Chicago, IL 60604-3590

RECEIVED

JUL 18 2013

UIC BRANCH  
EPA, REGION 5

RE: Permit No. M403 / MI-133-3G-A002  
Part I MIT on Mosaic Class III Well 1014

The Part 1 Mechanical Integrity Test for Well 1014 was passed on July 9<sup>th</sup>, 2013. The EPA did not witness the test per instructions from Jeff McDonald of USEPA. Mr. Stafford Dusenbury of the Michigan Department of Environmental Quality was present to witness the test. The Annular Pressure Test form completed by Mr. Dusenbury is enclosed. The USEPA Standard Annular Pressure Test form for an un-witnessed test is enclosed, along with the calibration certification for the pressure gauge that was used.

The well was previously scheduled for internal mechanical integrity on May 8<sup>th</sup>, but would not hold pressure, apparently due to a poor seal with the bridge plug. Since a loss of mechanical integrity was reported, an EPA Well Rework Record is also enclosed.

Please review the attached information and authorize Mosaic Potash Hersey to resume injection of Well 1014.

If you need additional information, please contact me at 231-832-8824 or [douglas.patulski@mosaicco.com](mailto:douglas.patulski@mosaicco.com).

Sincerely,

Douglas M. Patulski  
Production Superintendent  
Mosaic Potash Hersey

Cc: Raymond Vugrinovich, Michigan Department of Environmental Quality

JUL 19 2013

## ANNULAR PRESSURE TEST

By authority of Part 615 or Part 625 of  
Act 451 PA 1994, as amended.  
Non-submission and/or falsification of this information  
may result in fines and/or imprisonment.

<p>By authority of Part 615 or Part 625 of Act 451 PA 1994, as amended. Non-submission and/or falsification of this information may result in fines and/or imprisonment.</p>		<p>Permit Number M-403</p>	
		<p>Well name &amp; No. 1014</p>	
		<p>Surface location NW 1/4 of SW 1/4 of NW 1/4, Section 26 T17N R 9W</p>	
<p>Name and address of permittee Hersey Mosiac</p>		<p>Township Hersey County Osceola</p>	
		<p>Well type</p> <p>Part 615 <input type="checkbox"/> Secondary recovery <input type="checkbox"/> Brine disposal</p> <p>Part 625 <input type="checkbox"/> Waste disposal <input checked="" type="checkbox"/> Solution mining</p>	
<p>Date of test 4/11/13 7-9-13</p>		<p>Casing 7" 23# L80 set @ 7933</p>	
<p>Type of gauge Parascientific Digiquartz Model 765</p>		<p>Tubing</p>	
<p>inch face      psi range 0-3000</p>		<p>Packer type/model 7" RBP</p>	
<p>New gauge <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No if no, enter date of test calibration</p>		<p>Packer depth 6000 ft MD</p>	
<p>Average rate during injection N/A</p>		<p>Type of non-corrosive liquid in the annulus brine</p>	
		<p>Maximum allowed injection pressure 1402</p>	

## TEST DATA

[illegible]

Comments Bled ~29.5 gallons from ~~runoff~~ after test. Quantity measured in 5 gallon bucket

Certification if witnessed by DEQ representative:

Signature of DEQ employee

Date 7-9-13

Certification if not witnessed by DEQ representative: "I state that I am authorized by said owner. This report was prepared under my supervision and direction. The facts stated herein are true, accurate and complete to the best of my knowledge."

Signature

Date \_\_\_\_\_

MAIL TO: OFFICE OF GEOLOGICAL SURVEY  
MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY  
PO BOX 30256  
LANSING MI 48909-7756

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
STANDARD ANNULAR PRESSURE TEST

Operator MOAIC POTASH HERSEY

State Permit No. MI 903

Address 1395 135TH AVE

USEPA Permit No. MI-133-36-A002

HERSEY, MI 49639

Date of Test 7/9/2013

Well Name MOAIC 1014

Well Type CLASS III

LOCATION INFORMATION NW Quarter of the SW Quarter of the NW Quarter

of Section 26; Range 9W; Township 17N; County OSCEOLA;

Company Representative William Hicks; Field Inspector STAFFORD DUSENBURY (MOE)

Type of Pressure Gauge Paroscientific Digital inch face; 0-3000 psi full scale; 0.0000 psi increments;

New Gauge? Yes ☐ No ☒ If no, date of calibration 6/26/2012 Calibration certification submitted? Yes ☒ No ☐

**TEST RESULTS**

Readings must be taken at least every 10 minutes for a minimum of 30 minutes for Class II, III and V wells and 60 minutes for Class I wells.

For Class II wells, annulus pressure should be at least 300 psig. For Class I wells, annulus pressure should be the greater of 300 psig or 100 psi above maximum permitted injection pressure.

Original chart recordings must be submitted with this form.

5-year or annual test on time? Yes ☐ No ☒

2-year test for TA'd wells on time? Yes ☐ No ☐

After rework? Yes ☒ No ☐

Newly permitted well? Yes ☐ No ☐

Time	Pressure (in psig)	
	Annulus	Tubing
<u>10:00</u>	<u>1384.4048</u>	<u>NONE</u>
<u>10:05</u>	<u>1384.0123</u>	
<u>10:10</u>	<u>1383.6617</u>	
<u>10:15</u>	<u>1383.1744</u>	
<u>10:20</u>	<u>1382.5665</u>	
<u>10:25</u>	<u>1382.1490</u>	
<u>10:30</u>	<u>1381.5997</u>	

Casing size 7" 23"

Tubing size NONE

Packer type BRIDGE PLUG

Packer set @ 6000 MD 5860 TVD APPROX.

Top of Permitted Injection Zone 5765'

Is packer 100 ft or less above top of

Injection Zone? Yes ☒ No ☐

If not, please submit a justification.

Fluid return (gal.) 29.5 GALLONS

Comments:

Test Pressures: Max. Allowable Pressure Change: Initial test pressure x 0.03 41.53 psi  
Test Period Pressure change 2.8051 psi

Test Passed ☒ Test Failed ☐

If failed test, well must be shut in, no injection can occur, and USEPA must be contacted within 24 hours. Corrective action needs to occur, the well retested, and written authorization received before injection can recommence.

I certify under penalty of law that this document and all attachments are, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations. (See 40 CFR 144.32(d))

William Hicks  
Printed Name of Company Representative

William Hicks  
Signature of Company Representative

7/9/2013  
Date



United States Environmental Protection Agency  
Washington, DC 20460

## WELL REWORK RECORD

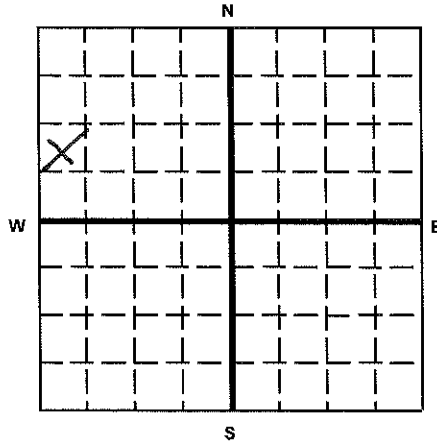
### Name and Address of Permittee

Mosaic Potash Hersey  
1395 135th Ave Hersey, MI 49639

### Name and Address of Contractor

Mosaic Potash Hersey  
1395 135th Ave Hersey, MI 49639

### Locate Well and Outline Unit on Section Plat - 640 Acres



### State

Michigan

### County

Oscola

### Permit Number

MI-133-3G-A002

### Surface Location Description

nw 1/4 of SW 1/4 of nw 1/4 of Section 26 Township 17n Range 09w

### Locate well in two directions from nearest lines of quarter section and drilling unit

### Surface

Location 234 ft. from (N/S) S Line of quarter section  
and 660 ft. from (E/W) W Line of quarter section.

### WELL ACTIVITY

- ☐ Brine Disposal  
☐ Enhanced Recovery  
☐ Hydrocarbon Storage  
☒ *SOLUTION MINING*

### Lease Name

Mosaic 1014

### Total Depth Before Rework

7933'

### Total Depth After Rework

7933'

### Date Rework Commenced

05/03/2013

### Date Rework Completed

06/29/2013

### TYPE OF PERMIT

☐ Individual

☒ Area

Number of Wells 16

### Well Number

1014

### WELL CASING RECORD -- BEFORE REWORK

Casing		Cement		Perforations		Acid or Fracture Treatment Record
Size	Depth	Sacks	Type	From	To	
13 3/8"	855'	400/300	Lite/ A			
9 5/8"	5195'	2175/400	Lite/ A			
7 "	7757'	530	G			

### WELL CASING RECORD -- AFTER REWORK (Indicate Additions and Changes Only)

Casing		Cement		Perforations		Acid or Fracture Treatment Record
Size	Depth	Sacks	Type	From	To	

### DESCRIBE REWORK OPERATIONS IN DETAIL USE ADDITIONAL SHEETS IF NECESSARY

Set Bridge plug @ 6000'. Would not test. Reported mechanical integrity failure. After reporting failure we found that the bridge plug must have leaked by. Pressured and depressured well again and bridge plug held. Test passed 7/9/2013.

### WIRE LINE LOGS, LIST EACH TYPE

### Log Types

### Logged Intervals


### Certification

I certify under the penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment. (Ref. 40 CFR 144.32)

### Name and Official Title (Please type or print)

William Hines Minefield Supervisor

### Signature

*William Hines*

### Date Signed

7/9/2013

## CERTIFICATE OF CONFORMANCE

CUSTOMER:

MOSAIC POTASH HERSEY

PURCHASE ORDER:

CHARGE

DIGIQUARTZ MODEL:

765-3K

PART NUMBER:

1100-019-0

SERIAL NUMBER(S):

105210

*PAROSCIENTIFIC INCORPORATED certifies that the part(s) identified above complies with the requirements of the above order and has been manufactured in accordance with engineering drawings, material and process specifications, testing procedures, and applicable specification drawing of Paroscientific Incorporated. The Digiquartz model(s) identified has been calibrated and tested over the specified pressure and temperature range and meets the requirements of the applicable specification drawing. Primary pressure, temperature standards and transfer standards used at Paroscientific Incorporated for calibration and testing have traceability to the National Institute of Standards and Technology and are regularly checked and calibrated according to Paroscientific QA Procedure Q8521, Inspection Test and Measurement Equipment, in accordance with the requirements of ISO 9001:2008.*



AUTHORIZED SIGNATURE

6/26/12

DATE

Warren Schuchman, Quality Assurance Manager



**Technology**

Precision Pressure Instrumentation

Document no. T8148, Rev "AU", 11 Oct 2011 page 1 of 2

## CERTIFICATION OF TRACEABILITY TO NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY

*Primary pressure and temperature standards used in the calibration and testing of Paroscientific Digiquartz Models have traceability to the National Institute of Standards and Technology through the following documentation.*

### Bell and Howell Primary Pressure Standard:

Bell and Howell, Model 6-201-0001, Piston/Cylinder P2-919/C2-1523 via DH Calibration Report No. 15441 and 16653 traceable to NIST. Weight Set 1, P/N 6-002-0002, via DH Calibration Report No. 14481, 16654 and 1284473284 traceable to NIST. Weight Set 2, P/N 6-002-0002, via DH Calibration Report No. 14576, 16603, 31227, 39628, 68390 and 1317389777 traceable to NIST. Piston/Cylinder P2-652/C2-1378 via DH Instruments Calibration Report No. 14575, 16602, 31226, 39627, 68389 and 1317739617 traceable to NIST. Piston/Cylinder P1-231/C1-384 via DH Instruments Calibration Report No. 13170 and 1284475131 traceable to NIST. Piston/Cylinder P/N 6-201, No. P1-949/C1-922, via DH Instruments Calibration Report 17176 and 17445, traceable to NIST.

### DH Primary Pressure Standard, Oil Operated Gauge:

DH Instruments, Model 5306, Piston/Cylinder S/N 3375, via DH Calibration Certificate Report No. 8398, 22146, 32354, 45306, 66563 and 1305698573 traceable to NIST. Piston/Cylinder 3511 via DH Calibration Report No. 8399, 22147, 32353, 45307, 66562 and 1305625084 traceable to NIST. Mass Set S/N 2032 via DH Calibration Report No. 24809, 24826, 45305, 45308, 1305538925 and 1305530461 traceable to NIST.

### DH Primary Pressure Standard, Pneumatic Operated Gauge:

DH Instruments, Model 5203, Piston/Cylinder S/N 4845, via DH Calibration Certificate No. 8541, 27161, 38275 and 1300177141 traceable to NIST. Mass Set S/N 2032/3293 via DH Calibration Certificate Nos. 4630, 24809, 8540, 32142, 45305 and 1300200369 traceable to NIST.

### DH Primary Pressure Standard, Pneumatic Operated Gauge:

DH instruments, Model PG7601 via DH Instruments Calibration No. 32162, 41492 and 69127 traceable to NIST. Piston/Cylinder S/N 305 via DH Instruments Calibration No. 20281, 32161, 41490 and 69125 traceable to NIST. DH Instruments 35 kg Mass Set No. 2052 and Bell No. 261A via DH Instruments Calibration Report No. 20282, 32163, 32164, 41491, 41493, 69126 and 69124 traceable to NIST.

### Hygroclip S3 MET4/4A Part number 1560-XXX and 1561-XXX:

Humidity and Temperature calibrations are traceable to NIST through Rotronic Instrument Corporation; 160 E. Main Street, Huntington, NY 11743.

### Hygroclip HC2-S3 MET4/4A Part number 1563-XXX and 1564-XXX Swiss Calibration Service (SCS)

Humidity and Temperature calibrations are traceable to SCS through Rotronic AG Grindelstrasse 6 8303 Bassersdorf Phone: 044-838-1111 E-mail: [info@rotronic.ch](mailto:info@rotronic.ch)





## CERTIFICATE OF CALIBRATION

DIGIQUARTZ MODEL: 765-3K

SERIAL NUMBER(S): 105210

The Paroscientific Digiquartz Model (s) identified above has been calibrated and tested with one or more of the following primary pressure standards. All have traceability to the National Institute of Standards and Technology.

### Bell and Howell Primary Pressure Standard

Pneumatic Absolute or Gauge Dead Weight Tester Part Number: 6-201-0001, S/N 4034 and S/N 1014

- |                                     |  |                          |  |
|-------------------------------------|--|--------------------------|--|
| <input type="checkbox"/>            | Piston/Cylinder: 6-001-0002, P2-919/C2-1523,<br>Weight Set 1: 6-002-0002<br>Range: 1.5 to 50 psi [10 to 345 kPa]<br>Accuracy: 0.010 percent of reading | <input type="checkbox"/> | Piston/Cylinder: 6-001-0001, P1-949/C1-922, Weight Set<br>2: 6-002-0002<br>Range: 0.3 to 5 psi [2 to 34 kPa]<br>Accuracy: 0.015 percent of reading |
| <input checked="" type="checkbox"/> | Piston/Cylinder: 6-001-0002, P2-652/C2-1378,<br>Weight Set 2: 6-002-0002<br>Range: 1.5 to 50 psi [10 to 345 kPa]<br>Accuracy: 0.010 percent of reading |                          |  |

### DH Primary Pressure Standard

Pneumatic Absolute or Gauge Dead Weight Tester Part Number: PG7601 S/N 161

- |                          |   |
|--------------------------|---|
| <input type="checkbox"/> | Piston/Cylinder: S/N 305, Mass Set: S/N 2052<br>Range: 0.7 to 50 psi [5 to 345 kPa] absolute mode, 0.29 to 50 psi [2 to 345 kPa] gauge mode<br>Accuracy: 0.002 percent of reading |
|--------------------------|---|

### DH Primary Pressure Standard

Pneumatic Gauge Dead Weight Tester, Model 5203, S/N 5557

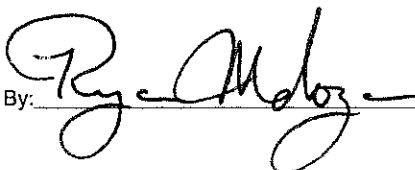
- |                          |   |
|--------------------------|---|
| <input type="checkbox"/> | Piston/Cylinder: S/N 4845, Mass Sets: S/N 2032, S/N 3293<br>Range: 20 to 1,600 psi [0.14 to 11 MPa]<br>Accuracy: 0.005 percent of reading |
|--------------------------|---|

### DH Primary Pressure Standard

Oil Operated Gauge Dead Weight Tester, Model 5306, S/N 3505

- |                                     |  |
|-------------------------------------|--|
| <input checked="" type="checkbox"/> | Piston/Cylinder: S/N 3375, Mass Set: S/N 2032<br>Range: 40 to 20,000 psi [0.3 to 138 MPa]<br>Accuracy: 0.01 percent of reading above 200 psi [1.4 MPa]<br>or 0.02 psi [0.14 kPa] at lower pressure |
| <input type="checkbox"/>            | Piston/Cylinder: S/N 3511, Mass Set: S/N 2032<br>Range: 145 to 72,500 psi [1 to 500 MPa]<br>Accuracy: 0.02 percent of reading above 725 psi [5 MPa]<br>or 0.145 psi [1 kPa] at lower pressure      |

Tested By:



DATE: 6/26/12



**Paroscientific, Inc.**  
**Pressure Instrument Configuration**

SN: 105210 Part Number: 1100-019-0 Model: 765-3K Port: Oil Filled  
 Calibration Date: 26-Jun-12 Report No: 14293 Technician: RM  
 Pressure Range: 0 to 3000 psia Temperature Range: 0 to 40 deg C

---

Customer: Mosaic Potash Hersey Report Date: 26-Jun-12  
 Address : 1395 135th Avenue Sales Order: 30096  
 Hersey, MI 49639 USA S/R Number : 10251

Configuration		Calibration Coefficients	
BL: 0	PT: N	U0: 5.813680	$\mu\text{sec}$
BR: 9600	QD: -	Y1: -3958.154	deg C / $\mu\text{sec}$
DD: -	QO: -	Y2: -13865.89	deg C / $\mu\text{sec}^2$
DL: 0	SL: -	Y3: -138805.8	deg C / $\mu\text{sec}^3$
DM: 0	SN: 105210	C1: -14414.57	psi
DO: -	ST: -	C2: -99.30154	psi / $\mu\text{sec}$
DP: 6	SU: 0	C3: 48299.55	psi / $\mu\text{sec}^2$
ID: 07	TI: 4670	D1: 0.0446906	
IM: -	TR: 952	D2: 0.0000000	
LL: -	TU: 0	T1: 30.00206	$\mu\text{sec}$
LH: -	UF: 1.000000	T2: 0.820646	$\mu\text{sec} / \mu\text{sec}$
MC: Y	UL: -	T3: 54.13041	$\mu\text{sec} / \mu\text{sec}^2$
MD: 1	UM: USER	T4: 71.54495	$\mu\text{sec} / \mu\text{sec}^3$
MN: 765-3K	UN: 1	T5: 2095.804	$\mu\text{sec} / \mu\text{sec}^4$
OP: -	US: 0	TC: 0.6781528	
PF: 3000.000	VR: P1.06	PA: -0.3538370	
PI: 4670	ZI: 0	PM: 0.9999510	
PL: 3600.000	ZS: 0		
PO: 0	ZL: 0		
PR: 238	ZV: .0000000		
PS: 0			
AL: .0000000			
AU: 3000.000			
GD: 0			
GT: 0			
LW: 0			
PC: .9999510			
PX: 5			
RS: 1			
RU: -			

Paroscientific, Inc.  
 4500 148th Ave. N.E. Redmond, WA 98052  
 Phone: (425)883-8700 Fax: (425)867-5407  
 Web: <http://www.paroscientific.com>  
 Email: [support@paroscientific.com](mailto:support@paroscientific.com)

Prepared by



Technology



**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY**

REGION 5

77 WEST JACKSON BOULEVARD  
CHICAGO, IL 60604-3590

JUL 19 2013

REPLY TO THE ATTENTION OF:

**WU-16J**

**CERTIFIED MAIL 7001 0320 0005 8923 5045**  
**RETURN RECEIPT REQUESTED**

Mr. Douglas M. Patulski  
Mosaic Potash Hersey, LLC  
1395 135th Avenue  
Hersey, Michigan 49639

**Re: Authorization to Inject into the Following Well:**

**Well #1014, Michigan Department of Environmental Quality (MDEQ) Permit  
M403; U. S. Environmental Protection Agency Permit Number MI-133-3G-A002  
in Osceola County, Michigan**

Dear Mr. Patulski:

The results of the mechanical integrity demonstration for the well referenced above have been reviewed and have been found to be satisfactory. In accordance with permit conditions, Mosaic Potash Hersey, LLC of Hersey, Michigan is authorized to recommence injection into the well referenced above.

Should you have any questions regarding the above information, feel free to contact Patrick Saieh at (312) 886-4240.

Sincerely yours,

Rebecca L. Harvey, Chief  
Underground Injection Control Branch

U.S. Postal Service  
**CERTIFIED MAIL RECEIPT**  
 (Domestic Mail Only; No Insurance Coverage Provided)

WU-16T(UIC)  
 F. Hardin (Case Em)  
 MI-133-3G-A002

7001 0320 0005 8923 5120

Postage	\$ 46 \$0.46	0041
Certified Fee	310 \$3.10	
Return Receipt Fee (Endorsement Required)	255 \$2.55	
Restricted Delivery Fee (Endorsement Required)	\$0.00	
Total Postage & Fees	\$ 68 \$6.11	

Sent to: Douglas Patulski / Mosais Patulski  
 Street, Apt. No., or PO Box No. 1395 135th Avenue  
 City, State, ZIP+4 Hersey, MI 49638 49639

Postmark Here: JUN 19 2013 CHICAGO, IL

PS Form 3800, January 2001 See Reverse for Instructions

WU-16T(UIC) F. Hardin (Case Em) MI-133-3G-A002

**SENDER: COMPLETE THIS SECTION**

- Complete items 1, 2, and 3. Also complete item 4 if Restricted Delivery is desired.
- Print your name and address on the reverse so that we can return the card to you.
- Attach this card to the back of the mailpiece, or on the front if space permits.

1. Article Addressed to:  
 Mr. Douglas M. Patulski  
 Mosais Patulski Hersey  
 1395 135th Avenue  
 Hersey, MI 49639

2. Article Number (Transfer from service label) 7001 0320 0005 8923 5120

**COMPLETE THIS SECTION ON DELIVERY**

A. Signature ☒ Agent ☐ Addressee  
 X Leslie Hicks

B. Received by (Printed Name) Leslie Hicks

C. Date of Delivery 6-28

D. Is delivery address different from item 1? ☐ Yes ☐ No  
 If YES, enter delivery address below:

3. Service Type  
☒ Certified Mail ☐ Express Mail  
☐ Registered ☐ Return Receipt for Merchandise  
☐ Insured Mail ☐ C.O.D.

4. Restricted Delivery? (Extra Fee) ☐ Yes

PS Form 3811, February 2004 Domestic Return Receipt 102595-02-M-1540



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
REGION 5  
77 WEST JACKSON BOULEVARD  
CHICAGO, IL 60604-3590

JUN 24 2013

REPLY TO THE ATTENTION OF:  
WU-16J

**CERTIFIED MAIL** 7001 0320 0005 8923 5120  
**RETURN RECEIPT REQUESTED**

Mr. Douglas M. Patulski  
Mosaic Potash Hersey LLC  
1395 135<sup>th</sup> Avenue  
Hersey, Michigan 49639

Re: Cease Injection: Well #1014 Injection Well, Osceola County, Michigan  
Class III U. S. Environmental Protection Agency Permit #MI-133-3G-A002

Dear Mr. Patulski:

The U. S. Environmental Protection Agency has received your letter dated May 9, 2013 regarding the loss of mechanical integrity for the above referenced injection well. Based on the information that was reported in your letter dated May 9, 2013 the EPA has concluded that the above referenced well lost mechanical integrity pursuant to 40 CFR § 146.8(a)(1) (enclosed).

You are hereby notified that the above referenced well must remain shut in until the requirements in the paragraph below are met. Continued injection is a violation of the Underground Injection Control regulations and the Safe Drinking Water Act.

Within 30 days from receipt of this letter, you must satisfy the mechanical integrity requirement of 40 CFR §146.8(a)(1). Also, be advised that pursuant to your permit conditions, you are required to notify the EPA contact persons Fredia Hardin (312) 886-1493 or Jeffrey McDonald (312) 353-6288 at least 30 days in advance to schedule the witnessing of the mechanical integrity test or the plugging and abandonment of the well. The scheduling of the witnessing of these mechanical integrity tests must go through the Region 5, Chicago Office. Injection may not resume until you have met these requirements and received written authorization to resume injection.



You should be aware that violations of the Safe Drinking Water Act and Underground Injection Control regulations are subject to Administrative Orders which may include penalties of up to \$177,500 civil penalties of up to \$37,500 per day of violation, and criminal penalties of up to 3 years imprisonment and fines in accordance with Title 18 of the United States Code, should you decide to continue injection.

Sincerely,

Rebecca L. Harvey, Chief  
Underground Injection Control Branch

Enclosure

cc: Sam Williams  
AEM Group

bcc: Fredia Hardin

6/20/13/Cease Injection Letter to MOSAIC POTASH HERSEY LLC  
on F.Hardin's F-Drive  
MosaicA002-1014(Ltrhead-2013).doc

AP for LTH 6/21/13  
AP 6/21/13  
AA  
6/20/13





UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
REGION 5  
77 WEST JACKSON BOULEVARD  
CHICAGO, IL 60604-3590

JUN 24 2013

REPLY TO THE ATTENTION OF:  
WU-16J

**CERTIFIED MAIL 7001 0320 0005 8923 5120**  
**RETURN RECEIPT REQUESTED**

Mr. Douglas M. Patulski  
Mosaic Potash Hersey LLC  
1395 135<sup>th</sup> Avenue  
Hersey, Michigan 49639

Re: Cease Injection: Well #1014 Injection Well, Osceola County, Michigan  
Class III U. S. Environmental Protection Agency Permit #MI-133-3G-A002

Dear Mr. Patulski:

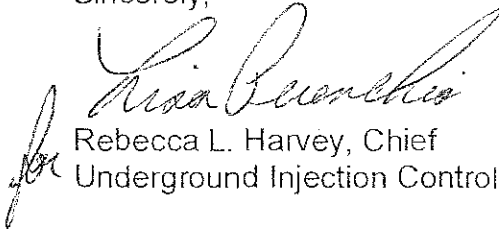
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Sincerely,

  
Rebecca L. Harvey, Chief  
Underground Injection Control Branch

Enclosure.

cc: Sam Williams  
AEM Group

Hardin, Fredia

From: Streem Center [DoNotReply@epa.gov]  
Sent: Monday, June 24, 2013 4:14 PM  
To: Hardin, Fredia  
Subject: Streem Results - Failure - Fax

*FAX  
did not go  
thru*

Streem Broadcast		<u>Result Summary</u> (click to view results on-line)	
Job Number	2779	Submitted	6/24/2013 4:06:53 PM
Subject	Fax	Recipients	1
Total Pages	3	Status	0 of 1 successful
Billing Info			

Recipient Results						
Name	Number/ Address	Result	Acknowledgement Attempts	Date/ Time	Elapsed Time	
	(231) 832- 3349	Error: Can't complete call: Not Connected	2	6/24/2013 4:13:01 PM	01:40	



Mosaic Potash Hersey, LLC  
1395 135<sup>th</sup> Avenue  
Hersey, MI 49639  
www.mosaicco.com

Tel 231-832-8800  
Fax 231-832-3349

*Aradia - please prepare  
a cease injection letter. Thanks*  
**RECEIVED**  
*5/16*

May 9<sup>th</sup>, 2013

MAY 14 2013

Lisa Perenchio, Chief  
Underground Injection Control Branch  
United States Environmental Protection Agency  
77 W. Jackson Blvd, WU-16J  
Chicago, IL 60604-3590

**UIC BRANCH**  
EPA, REGION 5

*Osceola  
County*

RE: MI-133-3G-A002  
Mosaic Class III Well 1014 – Loss of Mechanical Integrity

On May 8<sup>th</sup>, 2013, prior to starting the Part I MIT (Annular Pressure Test), it was determined that the Mosaic Class III Solution Mining Well 1014 had lost mechanical integrity. There was a steady loss of annulus pressure while pressuring up the well. The test was ceased and the well was shut-in with a verified loss of mechanical integrity at approximately 2:00pm. The well had previously been shut-in since November 11<sup>th</sup>, 2010. This well will not be operated until repairs have been made and permission to inject is received from the EPA.

I left a message on Jeff McDonald's phone on the 9<sup>th</sup> regarding the loss of mechanical integrity in compliance with Part I(E)(10)(e)(i) of the permit. This letter is the written notification required by Part I(E)(10)(e)(ii) of the permit.

If you need additional information, please contact me at 231-832-8824 or [douglas.patulski@mosaicco.com](mailto:douglas.patulski@mosaicco.com).

Sincerely,

Douglas M. Patulski  
Production Superintendent  
Mosaic Potash Hersey

Cc: Raymond Vugrinovich, Michigan Department of Environmental Quality  
Cc: Karl Tomaszewski, Site Manager Hersey

m4/33 3G A002

Urchel, Raymond

From: Urchel, Raymond  
Sent: Tuesday, June 04, 2013 9:53 AM  
To: Patrick Saieh; Clarissa Manzon  
Subject: Class 3 Mosaic #2062

Patrick – According to the data base, this well has been TA for more than 2 years – a permit violation.

I left a voice mail with Ray Vugrinovich late Friday afternoon to see what MDEQ showed.

He left me a voice mail message yesterday.

On May 8, 2013, he witnessed both a temperature log and an annulus pressure test at the well. (Violation goes poof!)

He said both passed. He also said he sent in a letter to the Region about this.

Patrick, what information do you need so the test results can be added to the UIC data base? Did you get the letter from Ray Vugrinovich?

Ray

Clarissa – Bill Bates is  
Checking the two tests. He  
Will update the UIC  
data base.

Ray 6/4/2013

Ray.

B. Bates - 6/6/2013

He updated the database.

Test date - 5-15-2013.

Clarissa

} Done



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Facility: Mosaic Potash Hersey Llc  
 Permit: MI-133-3G-A002  
 Well: WELL #2062

State Permit:

MIS M409

Contact:

Karl Tomaszewski 231-832-8800

## Reports

YEAR	MIP	MIR	MAP	MIAPD	IV	PH	SG
2008						7.20	1.18
2009						7.90	1.04
2010						7.30	1.17
2011						6.90	1.0410
2012						7.40	1.0320

## Quarterly Reports

YEAR	QUARTER	MIP	MIR	MAP	MIAPD	IV	PH	SG	FL
2009	1						7.90	1.04	
2010	1						7.30	1.17	

## Monthly Reports

YEAR	MONTH	MIP	MIR	MAP	MIAPD	IV	PH	SG
2013	Feb	0	0					
2013	Jan	0	0					
2012	Dec	0	0				7	1.0680
2012	Nov	0	0					
2012	Oct	0	0					
2012	Sep	0	0				9	1.0240
2012	Aug	0	0					
2012	Jul	0	0					
2012	Jun	0	0				7.50	1.0220
2012	May	0	0					
2012	Apr	0	0					
2012	Mar	0	0				7.40	1.0320
2012	Feb	0	0					
2012	Jan	0	0					
2011	Dec	0	0				7.90	1.0040
2011	Nov	0	0					
2011	Oct	0	0					
2011	Sep	0	0				6.90	1.0960
2011	Aug	0	0					
2011	Jul	0	0					
2011	Jun	0	0				7.10	1.0640
2011	May	0	0					
2011	Apr	0	0					
2011	Mar	0	0				6.90	1.0410
2011	Feb	0	0					
2011	Jan	0	0					
2010	Dec	0	0					
2010	Nov	0	0					
2010	Oct	0	0					
2010	Sep	0	0				7.70	1.06
2010	Aug	0	0					

Temp Log  
 Annulus Press. Test

State Permit:

MIS M409

Contact:

Karl Tomaszewski 231-832-8800

poss ✓

5/8/2013  
 Did we get  
 the temp log ✓

ALL zeros

2010 - 2011 - 2012  
 and part of 2013

Hold  
 5/31/2013  
 RM

2010	Jul	0	0		
2010	Jun	0	0		
2010	May	0	0	7.30	1.17
2010	Apr	0	0	7.30	1.17
2010	Mar	0	0	7.30	1.17
2010	Feb	0	0	7.30	1.17
2010	Jan	0	0	7.30	1.17



14. Plugging and Abandonment. The permittee shall plug and abandon any well covered under this permit consistent with 40 CFR 146.10, as provided for in the plugging and abandonment plan contained in Part III(B) of this permit. Within sixty (60) working days after plugging a well, or at the time of the next quarterly report (whichever is shorter), the permittee shall submit a report to the Director. The report shall be certified as accurate by the person who performed the plugging operation, and shall consist of either:
  - (a) A statement that the well was plugged in accordance with the plan previously submitted to the Director; or
  - (b) If the actual plugging differed from the approved plan, a statement defining the actual plugging and explaining why the Director should approve such deviation. Any deviation from a previously approved plan which may endanger underground sources of drinking water is cause for the Director to require the operator to replug the well.
15. Inactive Wells. After cessation of injection for two (2) years the permittee shall plug and abandon a well in accordance with the plan and 40 CFR 144.52 (a) (6) unless the permittee has:
  - (a) Provided notice to the Director; and
  - (b) Described actions or procedures, which are deemed satisfactory by the Director, that the permittee will take to ensure that the well will not endanger underground sources of drinking water during the period of temporary abandonment. These actions and procedures shall include compliance with the technical requirements applicable to active injection wells unless waived, in writing, by the Director.
16. Financial Responsibility - The permittee shall maintain financial responsibility and resources to plug and abandon the underground injection wells in accordance with 40 CFR 144.52(a) (7) as provided in Attachment R of the administrative record corresponding to this permit action which is hereby incorporated by reference as if it appeared fully set forth herein. The permittee shall not substitute an alternative demonstration of financial responsibility from that which the Director has approved, unless the permittee has previously submitted evidence of that alternative demonstration to the Director and the Director has notified the permittee in writing that the alternative demonstration of financial responsibility is acceptable. The financial responsibility mechanism shall be updated periodically, upon request of the Director, except when

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**Facility Name:** Mosaic Potash Hersey LLC **Contact:** Robert Schweitzer **Class:** 3A  
**EPA Permit:** MI 133-3G A002 **State Permit #:** MIS M409 **Permit Type:** Area Permit  
**Well Name:** WELL #2062 **Status:** Active **Status Date:** 12/17/1996

Monitoring					Tests				
	Report Type	Year	Period	Date Received					
Edit	monthly	2013	Feb	3/12/2013	Next Part 1 Test Due: 6/27/2006				
Edit	monthly	2013	Jan	2/13/2013	Next Part 2 Test Due: 11/8/2011				
Edit	annual	2012	annual	4/19/2012		Category	Type	Date	Result
Edit	monthly	2012	Dec	1/22/2013	Edit	Part 2	Temperature Log	11/8/2006	Pass
Edit	monthly	2012	Nov	12/14/2012	Edit	Part 1	Standard Annulus Pressure Test	6/27/2001	Pass
Edit	monthly	2012	Oct	11/15/2012					
Edit	monthly	2012	Sep	10/16/2012					
Edit	monthly	2012	Aug	9/13/2012					
Edit	monthly	2012	Jul	8/27/2012					
<a href="#">Add Report</a>					<a href="#">Report History</a>				
					<a href="#">Add Test</a>				

Inspections				Violations			
	Well	Type	Date				
Edit	WELL #2062	Mechanical Integrity Tests Witnessed	6/27/2001				
<a href="#">Add Inspection</a>				<a href="#">Add Violation</a>			
				<a href="#">Add Enforcement</a>			

A. Area of Review Methods

B. Maps of Wells : Area of Review

C. Corrective Action Plan and Well Data

D. Maps and Cross-sections of USDWs

F. Maps and Cross-sections of the geologic structure of the area

H. Operating Data

I. Formation Testing (for new wells only)

J. Stimulation Program

K. Injection Procedures

L. Construction Procedures

M. Construction Details

O. Plans for well failure

P. Monitoring Program

Q. Plugging and Abandonment Plan

R. Necessary Resources

( See Attached )

Expanded  
Test

S. Aquifer Exemptions

T. Existing Permits

U. Description of Business

V. Compliance with other Federal Acts

X. Confidentiality

Other

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**Facility:** Mosaic Potash Hersey Llc

**Permit:** MI-133-3G-A002

**Well:** WELL #2062

**State Permit:** MIS M409

**Contact:** Karl Tomaszewski 231-832-8800

#### Reports

YEAR	MIP	MIR	MAP	MIAPD	IV	PH	SG
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2010						7.30	1.17
2011						6.90	1.0410
2012						7.40	1.0320
2013						8.80	1.0380

#### Quarterly Reports

YEAR	QUARTER	MIP	MIR	MAP	MIAPD	IV	PH	SG	FL
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#### Monthly Reports

YEAR	MONTH	MIP	MIR	MAP	MIAPD	IV	PH	SG
2013	Mar	0	0				8.80	1.0380
2013	Feb	0	0					
2013	Jan	0	0					
2012	Dec	0	0			7		1.0680
2012	Nov	0	0					
2012	Oct	0	0					
2012	Sep	0	0			9		1.0240
2012	Aug	0	0					
2012	Jul	0	0					
2012	Jun	0	0			7.50		1.0220
2012	May	0	0					
2012	Apr	0	0					
2012	Mar	0	0			7.40		1.0320
2012	Feb	0	0					
2012	Jan	0	0					
2011	Dec	0	0			7.90		1.0040
2011	Nov	0	0					
2011	Oct	0	0					
2011	Sep	0	0			6.90		1.0960
2011	Aug	0	0					
2011	Jul	0	0					

2011	Jun	0	0	7.10	1.0640
2011	May	0	0		
2011	Apr	0	0		
2011	Mar	0	0	6.90	1.0410
2011	Feb	0	0		
2011	Jan	0	0		
2010	Dec	0	0		
2010	Nov	0	0		
2010	Oct	0	0		
2010	Sep	0	0	7.70	1.06
2010	Aug	0	0		
2010	Jul	0	0		
2010	Jun	0	0		
2010	May	0	0	7.30	1.17
2010	Apr	0	0	7.30	1.17
2010	Mar	0	0	7.30	1.17
2010	Feb	0	0	7.30	1.17
2010	Jan	0	0	7.30	1.17

[Home](#)[Front Office](#)[WECAB](#)[GWDW](#)[NPDES](#)[STPB](#)[UIC](#)[WQB](#)[WW](#)[Deepwell Home](#)[Add](#)[Reports](#)[Print](#)[Home > Technical Review](#)Facility Name: [Mosaic Potash Hersey LLC](#)

Contact: Robert Schweitzer

Class: 3A

EPA Permit: [MI-133-3G-A002](#)

State Permit #: MIS M409

Permit Type: Area Permit

Well Name: [WELL #2062](#)

Status: Active

Status Date: 12/17/1996

## Monitoring

	Report Type	Year	Period	Date Received
Edit	annual	2013	annual	4/22/2013
Edit	monthly	2013	Mar	4/22/2013
Edit	monthly	2013	Feb	3/12/2013
Edit	monthly	2013	Jan	2/13/2013
Edit	annual	2012	annual	4/19/2012
Edit	monthly	2012	Dec	1/22/2013
Edit	monthly	2012	Nov	12/14/2012
Edit	monthly	2012	Oct	11/15/2012
Edit	monthly	2012	Sep	10/16/2012

[Add Report](#)[Report History](#)

## Tests

Next Part 1 Test Due: 6/27/2006

Next Part 2 Test Due: 11/8/2011

	Category	Type	Date	Result
Edit	Part 2	Temperature Log	11/8/2006	Pass
Edit	Part 1	Standard Annulus Pressure Test	6/27/2001	Pass

## Inspections

	Type	Date
Edit	WELL #2062 Mechanical Integrity Tests Witnessed	6/27/2001

[Add Inspection](#)

## Violations

[Add Violation](#)[Add Enforcement](#)

A. Area of Review Methods

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T. Existing Permits

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X. Confidentiality

Other

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U.S. Postal Service  
**CERTIFIED MAIL RECEIPT**  
 (Domestic Mail Only; No Insurance Coverage Provided)

7001 0320 0005 8923 5007

OFFICIAL USE

Postage \$  
 Certified Fee  
 Return Receipt Fee (Endorsement Required)  
 Restricted Delivery Fee (Endorsement Required)  
 Total Postage & Fees \$ 6.11

Sent To Douglas Patulski-Mosaic  
 Street, Apt. No. or PO Box No. 1395 135th Ave  
 City, State, Zip+4 Hersey, MI 49639

PS Form 3800, January 2001  
 See Reverse for Instructions

Postmark Here AUG 14 2013

Mosaic well 1013 said 104-165 UIC

**SENDER: COMPLETE THIS SECTION**

- Complete items 1, 2, and 3. Also complete item 4 if Restricted Delivery is desired.
- Print your name and address on the reverse so that we can return the card to you.
- Attach this card to the back of the mailpiece, or on the front if space permits.

1. Article Addressed to:  
 Douglas Patulski  
 Mosaic  
 1395 135th Ave.  
 Hersey, MI 49639

2. Article Number (Transfer from service label) 7001 0320 0005 8923 5007

PS Form 3811, February 2004

**COMPLETE THIS SECTION ON DELIVERY**

A. Signature X [Signature]  
☐ Agent  
☒ Addressee

B. Received by (Printed Name) Justin Wilson  
 C. Date of Delivery 8-22

D. Is delivery address different from item 1? ☐ Yes  
 If YES, enter delivery address below: ☐ No

3. Service Type  
☒ Certified Mail ☐ Express Mail  
☐ Registered ☐ Return Receipt for Merchandise  
☐ Insured Mail ☐ C.O.D.

4. Restricted Delivery? (Extra Fee) ☐ Yes

Domestic Return Receipt 102595-02-M-1540



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION 5

77 WEST JACKSON BOULEVARD  
CHICAGO, IL 60604-3590

AUG 13 2013

REPLY TO THE ATTENTION OF:

WU-16J

**CERTIFIED MAIL 7001 0320 0005 8923 5007**  
**RETURN RECEIPT REQUESTED**

Mr. Douglas M. Patulski  
Mosaic Potash Hersey, LLC  
1395 135th Avenue  
Hersey, Michigan 49639

**Re: Authorization to Inject into the Following Well:**

**Well #1013, Michigan Department of Environmental Quality (MDEQ) Permit  
M385; U. S. Environmental Protection Agency Permit Number MI-133-3G-A002  
in Osceola County, Michigan**

Dear Mr. Patulski:

The results of the mechanical integrity demonstration for the well referenced above have been reviewed and have been found to be satisfactory. In accordance with permit conditions, Mosaic Potash Hersey, LLC of Hersey, Michigan is authorized to recommence injection into the well referenced above.

Should you have any questions regarding the above information, feel free to contact Patrick Saieh at (312) 886-4240 or [saieh.patrick@epa.gov](mailto:saieh.patrick@epa.gov).

Sincerely yours,

Rebecca L. Harvey, Chief  
Underground Injection Control Branch

HA 8/13/13 PRM RR. 8/13/13 PRM 8/13/13 P.S. 8/12/13



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
REGION 5  
77 WEST JACKSON BOULEVARD  
CHICAGO, IL 60604-3590

AUG 13 2013

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Mosaic Potash Hersey, LLC  
1395 135th Avenue  
Hersey, Michigan 49639

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Sincerely yours,

A handwritten signature in black ink, appearing to read "Rebecca L. Harvey".

Rebecca L. Harvey, Chief  
Underground Injection Control Branch



Mosaic Potash Hersey LLC  
1395 135<sup>th</sup> Avenue  
Hersey, MI 49639  
www.mosaicco.com

Tel 231-832-8800  
Fax 231-832-3349

August 7<sup>th</sup>, 2013

Lisa Perenchio, Chief  
Underground Injection Control Branch  
United States Environmental Protection Agency  
77 W. Jackson Blvd, WU-16J  
Chicago, IL 60604-3590

RECEIVED

AUG 12 2013

UIC BRANCH  
EPA, REGION 5

RE: Permit No. M385 / MI-133-3G-A002  
Part I MIT on Mosaic Class III Well 1013

The Part 1 Mechanical Integrity Test for Well 1013 was passed on August 1<sup>st</sup>, 2013. The EPA did not witness the test per instructions from Jeff McDonald of USEPA. Mr. Ray Vugrinovich of the Michigan Department of Environmental Quality was present to witness the test. The Annular Pressure Test form completed by Mr. Vugrinovich is enclosed. The USEPA Standard Annular Pressure Test form for an un-witnessed test is enclosed, along with the calibration certification for the pressure gauge that was used.

The Internal MIT for this well was overdue, since March 12<sup>th</sup>, 2013. The well has been shut-in prior to that date and since. Please review the attached information and authorize Mosaic Potash Hersey to resume injection of Well 1013.

If you need additional information, please contact me at 231-832-8824 or [douglas.patulski@mosaicco.com](mailto:douglas.patulski@mosaicco.com).

Sincerely,

Douglas M. Patulski  
Production Superintendent  
Mosaic Potash Hersey

Cc: Raymond Vugrinovich, Michigan Department of Environmental Quality

## ANNULAR PRESSURE TEST

By authority of Part 615 or Part 625 of  
Act 451 PA 1994, as amended.  
Non-submission and/or falsification of this information  
may result in fines and/or imprisonment.

<p>By authority of Part 615 or Part 625 of Act 451 PA 1994, as amended. Non-submission and/or falsification of this information may result in fines and/or imprisonment.</p>		<p>Permit Number <b>M385 MI-133-3G-A002</b></p>	
		<p>Well name &amp; No. <b>Kalium Hersey No. 1013</b></p>	
		<p>Surface location <b>SW 1/4 of NW 1/4 of SW NW 1/4, Section 26 T 17N R 09W</b></p>	
<p>Name and address of permittee <b>Mosaic Potash Hersey LLC 1395 135th Avenue Hersey, MI 49639</b></p>		<p>Township <b>Hersey</b></p> <p>County <b>Osceola</b></p>	
		<p>Well type</p> <p>Part 615 <input type="checkbox"/> Secondary recovery <input type="checkbox"/> Brine disposal</p> <p>Part 625 <input type="checkbox"/> Waste disposal <input checked="" type="checkbox"/> Solution mining</p>	
<p>Date of test <b>8/1/2013</b></p>		<p>Casing <b>7" 29# @ 7557 feet</b></p> <p>Tubing <b>NONE</b></p>	
<p>Type of gauge <b>PAROSCIENTIFIC MODEL 765</b></p> <p>inch face <b>DIGITAL</b> psi range <b>0-3000</b></p>		<p>Packer type/model <b>BRIDGE PLUG</b></p> <p>Packer depth <b>6100'</b></p>	
<p>New gauge <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No</p> <p>if no, enter date of test calibration <b>6/26/2012</b></p>		<p>Type of non-corrosive liquid in the annulus</p>	
<p>Average rate during injection</p>		<p>Maximum allowed injection pressure</p>	

## TEST DATA

[illegible]

Comments Well pressurized to ~ 1124 psig @ 2:45pm 7/31/2013.  
Observed pressure change: 0.3819 psig; 3% change: 32.9177 psig.  
Well demonstrates internal mechanical integrity.

Certification if witnessed by DEQ representative:

Signature of DEQ employee

Date 08/01/2013

Certification if not witnessed by DEQ representative: "I state that I am authorized by said owner. This report was prepared under my supervision and direction. The facts stated herein are true, accurate and complete to the best of my knowledge."

Signature

Date \_\_\_\_\_

MAIL TO: OFFICE OF OIL, GAS AND MINERALS  
MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY  
PO BOX 30256  
LANSING MI 48909-7756



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
STANDARD ANNULAR PRESSURE TEST

Operator MOBAC POTASH HERSEY

State Permit No. M-385

Address 1395 135<sup>TH</sup> AVE  
HERSEY, MI 49639

USEPA Permit No. MI-133-36-A002

Date of Test 8/1/2013

Well Name MOBAC 1013

Well Type JIT

LOCATION INFORMATION SW Quarter of the NW Quarter of the NW Quarter

of Section 26; Range 09W; Township 17N; County OSCEOLA;

Company Representative William Hicks; Field Inspector RAY VANDERHOUGH (MDEQ)

Type of Pressure Gauge DIGITAL inch face; 0-3000 psi full scale; 0.0000 psi increments;

New Gauge? Yes ☐ No ☒ If no, date of calibration 6/24/2012 Calibration certification submitted? Yes ☒ No ☐

**TEST RESULTS**

Readings must be taken at least every 10 minutes for a minimum of 30 minutes for Class II, III and V wells and 60 minutes for Class I wells.

For Class II wells, annulus pressure should be at least 300 psig. For Class I wells, annulus pressure should be the greater of 300 psig or 100 psi above maximum permitted injection pressure.

Original chart recordings must be submitted with this form.

5-year or annual test on time? Yes ☐ No ☒

2-year test for TA'd wells on time? Yes ☐ No ☐

After rework? Yes ☐ No ☒

Newly permitted well? Yes ☐ No ☒

Time	Pressure (in psig)	
	Annulus	Tubing
<u>0815</u>	<u>1097.2545</u>	<u>NONE</u>
<u>0820</u>	<u>1097.1527</u>	
<u>0825</u>	<u>1097.0835</u>	
<u>0830</u>	<u>1097.0092</u>	
<u>0835</u>	<u>1096.9446</u>	
<u>0840</u>	<u>1096.9037</u>	
<u>0845</u>	<u>1096.8746</u>	

Casing size 7" 23 #

Tubing size NONE

Packer type BRIDGE PLUG

Packer set @ 6100'

Top of Permitted Injection Zone 5765'

Is packer 100 ft or less above top of

Injection Zone? Yes ☒ No ☐

If not, please submit a justification.

Fluid return (gal.) 37 GALLONS

Comments:

Test Pressures: Max. Allowable Pressure Change: Initial test pressure x 0.03 32.9177 psi  
Test Period Pressure change 0.3819 psi

Test Passed ☒ Test Failed ☐

If failed test, well must be shut in, no injection can occur, and USEPA must be contacted within 24 hours. Corrective action needs to occur, the well retested, and written authorization received before injection can recommence.

I certify under penalty of law that this document and all attachments are, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations. (See 40 CFR 144.32(d))

William Hicks  
Printed Name of Company Representative

William Hicks  
Signature of Company Representative

8/1/2013  
Date



## CERTIFICATE OF CONFORMANCE

CUSTOMER:

MOSAIC POTASH HERSEY

PURCHASE ORDER:

CHARGE

DIGIQUARTZ MODEL:

765-3K

PART NUMBER:

1100-019-0

SERIAL NUMBER(S):

105210

*PAROSCIENTIFIC INCORPORATED certifies that the part(s) identified above complies with the requirements of the above order and has been manufactured in accordance with engineering drawings, material and process specifications, testing procedures, and applicable specification drawing of Paroscientific Incorporated. The DigiQuartz model(s) identified has been calibrated and tested over the specified pressure and temperature range and meets the requirements of the applicable specification drawing. Primary pressure, temperature standards and transfer standards used at Paroscientific Incorporated for calibration and testing have traceability to the National Institute of Standards and Technology and are regularly checked and calibrated according to Paroscientific QA Procedure Q8521, Inspection Test and Measurement Equipment, in accordance with the requirements of ISO 9001:2008.*



AUTHORIZED SIGNATURE

6/26/12

DATE

Warren Schuchman, Quality Assurance Manager



**Technology**

Precision Pressure Instrumentation

Document no. T8148, Rev "AU", 11 Oct 2011 page 1 of 2

## CERTIFICATION OF TRACEABILITY TO NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY

*Primary pressure and temperature standards used in the calibration and testing of Paroscientific Digiquartz Models have traceability to the National Institute of Standards and Technology through the following documentation.*

### Bell and Howell Primary Pressure Standard:

Bell and Howell, Model 6-201-0001, Piston/Cylinder P2-919/C2-1523 via DH Calibration Report No. 15441 and 16653 traceable to NIST. Weight Set 1, P/N 6-002-0002, via DH Calibration Report No. 14481, 16654 and 1284473284 traceable to NIST. Weight Set 2, P/N 6-002-0002, via DH Calibration Report No. 14576, 16603, 31227, 39628, 68390 and 1317389777 traceable to NIST. Piston/Cylinder P2-652/C2-1378 via DH Instruments Calibration Report No. 14575, 16602, 31226, 39627, 68389 and 1317739617 traceable to NIST. Piston/Cylinder P1-231/C1-384 via DH Instruments Calibration Report No. 13170 and 1284475131 traceable to NIST. Piston/Cylinder P/N 6-201, No. P1-949/C1-922, via DH Instruments Calibration Report 17176 and 17445, traceable to NIST.

### DH Primary Pressure Standard, Oil Operated Gauge:

DH Instruments, Model 5306, Piston/Cylinder S/N 3375, via DH Calibration Certificate Report No. 8398, 22146, 32354, 45306, 66563 and 1305698573 traceable to NIST. Piston/Cylinder 3511 via DH Calibration Report No. 8399, 22147, 32353, 45307, 66562 and 1305625084 traceable to NIST. Mass Set S/N 2032 via DH Calibration Report No. 24809, 24826, 45305, 45308, 1305538925 and 1305530461 traceable to NIST.

### DH Primary Pressure Standard, Pneumatic Operated Gauge:

DH Instruments, Model 5203, Piston/Cylinder S/N 4845, via DH Calibration Certificate No. 8541, 27161, 38275 and 1300177141 traceable to NIST. Mass Set S/N 2032/3293 via DH Calibration Certificate Nos. 4630, 24809, 8540, 32142, 45305 and 1300200369 traceable to NIST.

### DH Primary Pressure Standard, Pneumatic Operated Gauge:

DH instruments, Model PG7601 via DH Instruments Calibration No. 32162, 41492 and 69127 traceable to NIST. Piston/Cylinder S/N 305 via DH Instruments Calibration No. 20281, 32161, 41490 and 69125 traceable to NIST. DH Instruments 35 kg Mass Set No. 2052 and Bell No. 261A via DH Instruments Calibration Report No. 20282, 32163, 32164, 41491, 41493, 69126 and 69124 traceable to NIST.

### Hygroclip S3 MET4/4A Part number 1560-XXX and 1561-XXX:

Humidity and Temperature calibrations are traceable to NIST through Rotronic Instrument Corporation; 160 E. Main Street, Huntington, NY 11743.

### Hygroclip HC2-S3 MET4/4A Part number 1563-XXX and 1564-XXX Swiss Calibration Service (SCS)

Humidity and Temperature calibrations are traceable to SCS through Rotronic AG Grindelstrasse 6 8303 Bassersdorf Phone: 044-838-1111 E-mail: info@rotronic.ch



## CERTIFICATE OF CALIBRATION

DIGIQUARTZ MODEL: 765-3K

SERIAL NUMBER(S): 105210

The Paroscientific DigiQuartz Model (s) identified above has been calibrated and tested with one or more of the following primary pressure standards. All have traceability to the National Institute of Standards and Technology.

### Bell and Howell Primary Pressure Standard

Pneumatic Absolute or Gauge Dead Weight Tester Part Number: 6-201-0001, S/N 4034 and S/N 1014

- |                                     |  |                          |  |
|-------------------------------------|--|--------------------------|--|
| <input type="checkbox"/>            | Piston/Cylinder: 6-001-0002, P2-919/C2-1523,<br>Weight Set 1: 6-002-0002<br>Range: 1.5 to 50 psi [10 to 345 kPa]<br>Accuracy: 0.010 percent of reading | <input type="checkbox"/> | Piston/Cylinder: 6-001-0001, P1-949/C1-922, Weight Set<br>2: 6-002-0002<br>Range: 0.3 to 5 psi [2 to 34 kPa]<br>Accuracy: 0.015 percent of reading |
| <input checked="" type="checkbox"/> | Piston/Cylinder: 6-001-0002, P2-652/C2-1378,<br>Weight Set 2: 6-002-0002<br>Range: 1.5 to 50 psi [10 to 345 kPa]<br>Accuracy: 0.010 percent of reading |                          |  |

### DH Primary Pressure Standard

Pneumatic Absolute or Gauge Dead Weight Tester Part Number: PG7601 S/N 161

- |                          |   |
|--------------------------|---|
| <input type="checkbox"/> | Piston/Cylinder: S/N 305, Mass Set: S/N 2052<br>Range: 0.7 to 50 psi [5 to 345 kPa] absolute mode, 0.29 to 50 psi [2 to 345 kPa] gauge mode<br>Accuracy: 0.002 percent of reading |
|--------------------------|---|

### DH Primary Pressure Standard

Pneumatic Gauge Dead Weight Tester, Model 5203, S/N 5557

- |                          |   |
|--------------------------|---|
| <input type="checkbox"/> | Piston/Cylinder: S/N 4845, Mass Sets: S/N 2032, S/N 3293<br>Range: 20 to 1,600 psi [0.14 to 11 MPa]<br>Accuracy: 0.005 percent of reading |
|--------------------------|---|

### DH Primary Pressure Standard

Oil Operated Gauge Dead Weight Tester, Model 5306, S/N 3505

- |                                     |  |
|-------------------------------------|--|
| <input checked="" type="checkbox"/> | Piston/Cylinder: S/N 3375, Mass Set: S/N 2032<br>Range: 40 to 20,000 psi [0.3 to 138 MPa]<br>Accuracy: 0.01 percent of reading above 200 psi [1.4 MPa]<br>or 0.02 psi [0.14 kPa] at lower pressure |
| <input type="checkbox"/>            | Piston/Cylinder: S/N 3511, Mass Set: S/N 2032<br>Range: 145 to 72,500 psi [1 to 500 MPa]<br>Accuracy: 0.02 percent of reading above 725 psi [5 MPa]<br>or 0.145 psi [1 kPa] at lower pressure      |

Tested By: 

DATE: 6/26/12



# Paroscientific, Inc.

## Pressure Instrument Configuration

**SN: 105210** Part Number: 1100-019-0 Model: 765-3K Port: Oil Filled  
 Calibration Date: 26-Jun-12 Report No: 14293 Technician: RM  
 Pressure Range: 0 to 3000 psia Temperature Range: 0 to 40 deg C  
 Customer: Mosaic Potash Hersey Report Date: 26-Jun-12  
 Address : 1395 135th Avenue Sales Order: 30096  
 Hersey, MI 49639 USA S/R Number : 10251

Configuration		Calibration Coefficients	
BL: 0	PT: N	U0: 5.813680 $\mu$ sec	
BR: 9600	QD: -	Y1: -3958.154 deg C / $\mu$ sec	
DD: -	QO: -	Y2: -13865.89 deg C / $\mu$ sec <sup>2</sup>	
DL: 0	SL: -	Y3: -138805.8 deg C / $\mu$ sec <sup>3</sup>	
DM: 0	SN: 105210	C1: -14414.57 psi	
DO: -	ST: -	C2: -99.30154 psi / $\mu$ sec	
DP: 6	SU: 0	C3: 48299.55 psi / $\mu$ sec <sup>2</sup>	
ID: 07	TI: 4670	D1: 0.0446906	
IM: -	TR: 952	D2: 0.0000000	
LL: -	TU: 0	T1: 30.00206 $\mu$ sec	
LH: -	UF: 1.000000	T2: 0.820646 $\mu$ sec / $\mu$ sec	
MC: Y	UL: -	T3: 54.13041 $\mu$ sec / $\mu$ sec <sup>2</sup>	
MD: 1	UM: USER	T4: 71.54495 $\mu$ sec / $\mu$ sec <sup>3</sup>	
MN: 765-3K	UN: 1	T5: 2095.804 $\mu$ sec / $\mu$ sec <sup>4</sup>	
OP: -	US: 0	TC: 0.6781528	
PF: 3000.000	VR: P1.06	PA: -0.3538370	
PI: 4670	ZI: 0	PM: 0.9999510	
PL: 3600.000	ZS: 0		
PO: 0	ZL: 0		
PR: 238	ZV: .0000000		
PS: 0			
AL: .0000000			
AU: 3000.000			
GD: 0			
GT: 0			
LW: 0			
PC: .9999510			
PX: 5			
RS: 1			
RU: -			

RECEIVED

AUG 12 2013

UIC BRANCH  
EPA, MICHIGAN

Paroscientific, Inc.  
 4500 148th Ave. N.E. Redmond, WA 98052  
 Phone: (425)883-8700 Fax: (425)867-5407  
 Web: <http://www.paroscientific.com>  
 Email: [support@paroscientific.com](mailto:support@paroscientific.com)

Prepared by



Technology

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
STANDARD ANNULAR PRESSURE TEST

Operator Mosaic Potash Hersey

State Permit No. 438

Address 1395 135th Ave

USEPA Permit No. MI-133-36-M002

HERSEY, MI 49639

Date of Test 12-4-2007

Well Name KALIAM 2082

Well Type III Solution Mining

LOCATION INFORMATION SE Quarter of the NW Quarter of the NW Quarter

of Section 26; Range 17N; Township 9W; County OSCEOLA;

Company Representative William Hicks; Field Inspector NONE;

Type of Pressure Gauge Parascientific inch face; 0-3000 psi full scale; 0.000 psi increments;

New Gauge? Yes ☒ No ☐ If no, date of calibration 9/10/2007 Calibration certification submitted? Yes ☒ No ☐

**TEST RESULTS**

Readings must be taken at least every 10 minutes for a minimum of 30 minutes for Class II, III and V wells and 60 minutes for Class I wells.

For Class II wells, annulus pressure should be at least 300 psig. For Class I wells, annulus pressure should be the greater of 300 psig or 100 psi above maximum permitted injection pressure.

Original chart recordings must be submitted with this form.

5-year or annual test on time? Yes ☐ No ☐

2-year test for TA'd wells on time? Yes ☐ No ☐

After rework? Yes ☒ No ☐

Newly permitted well? Yes ☐ No ☐

Time	Pressure (in psig)	
	Annulus	Tubing
<u>11:35</u>	<u>1022.714</u>	<u>N/A</u>
<u>11:40</u>	<u>1021.516</u>	
<u>11:45</u>	<u>1019.912</u>	
<u>11:50</u>	<u>1018.423</u>	
<u>11:55</u>	<u>1017.385</u>	
<u>12:00</u>	<u>1016.124</u>	
<u>12:05</u>	<u>1014.956</u>	

Casing size 7" 23"

Tubing size 3 1/2" D.P.

Packer type CIBP

Packer set @ 5815'

Top of Permitted Injection Zone 5765'

Is packer 100 ft or less above top of

Injection Zone? Yes ☐ No ☐

If not, please submit a justification.

Fluid return (gal.) 31.5 Gallons

Comments:

Test Pressures: Max. Allowable Pressure Change: Initial test pressure x 0.03 30.68 psi  
Test Period Pressure change 7.758 psi

Test Passed ☒ Test Failed ☐

If failed test, well must be shut in, no injection can occur, and USEPA must be contacted within 24 hours. Corrective action needs to occur, the well retested, and written authorization received before injection can recommence.

I certify under penalty of law that this document and all attachments are, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations. (See 40 CFR 144.32(d))

William C Hicks  
Printed Name of Company Representative

William C Hicks  
Signature of Company Representative

12-4-2007  
Date



RICK SNYDER  
GOVERNOR

STATE OF MICHIGAN  
DEPARTMENT OF ENVIRONMENTAL QUALITY  
LANSING



DAN WYANT  
DIRECTOR

August 8, 2013

AUG 13 2013

Mr. Doug Patulski, EHS/Minefield Superintendent  
Mosaic Potash Hersey  
1395 135th Avenue  
Hersey, Michigan 49639

UIC BRANCH  
U.S. REGION 5

Dear Mr. Patulski:

SUBJECT: Mechanical Integrity Testing, Kalium Hersey No. 1013, Permit Number 385-924-767

As required by R 299.2393, of the administrative rules promulgated under authority of Part 625, Mineral Wells, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended (NREPA), on Thursday, August 1, 2013, mechanical integrity testing on the subject well was conducted. I witnessed the test for the Department of Environmental Quality (DEQ). The test was not witnessed by a representative of the U.S. Environmental Protection Agency (USEPA). Internal mechanical integrity was demonstrated using an annulus pressure test. The well was off line at the time of the test; the well had been off line since prior to May 8, 2013. A retrievable bridge plug was set at 6,100 feet; the casing was pressurized to about 1124 psig at 2:45 p.m., July 31, 2013. I recorded the following casing pressures:

<u>Time</u>	<u>Casing Pressure (psig)</u>
08:15	1097.2565
08:20	1097.1527
08:25	1097.0835
08:30	1097.0022
08:35	1096.9446
08:40	1096.9037
08:45	1096.8746

The pressure change allowed by R 324.2393(4) is 54.8628 psig; a 3% pressure change is 32.9177 psig; total pressure change was 0.3819 psig. Pressure was measured using a Paroscientific digital pressure gauge supplied by Mosaic Potash Hersey, Model 765-3K, Serial No. 105210, pressure range 0 – 3000 psi; latest calibration was performed on June 26, 2012. The well demonstrates internal mechanical integrity. Use of the Kalium Hersey may be resumed at your convenience. Please note that USEPA has also issued a permit for the well and may require it to remain off line until USEPA personnel have reviewed the test results.

If you have any questions, please contact me by mail at DEQ, Office of Oil, Gas, and Minerals, P.O. Box 30256, Lansing, MI 48909, by phone at 517-241-1532, or email at [vugrinovichr@michigan.gov](mailto:vugrinovichr@michigan.gov).

Sincerely,

  
Raymond Vugrinovich, Senior Geologist  
Minerals and Mapping Unit

cc: Ms. Lisa Perenchio, USEPA, Region V  
Mr. Andy Stempky, DEQ



DEC 05 2007

WU-16J

**CERTIFIED MAIL 7007 0710 0003 4406 5910**  
**RETURN RECEIPT REQUESTED**

Mr. Robert Schweitzer  
Mosaic Potash Hersey LLC  
1395 135th Avenue  
Hersey, Michigan 49639

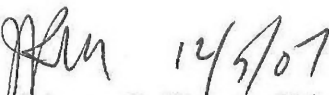
**Re: Authorization to Inject into the Following Well: Kalium 2082 Injection Well,  
Osceola County, Michigan; Class III United States Environmental  
Protection Agency (USEPA) Permit #MI-133-3G-0002**

Dear Mr. Schweitzer:

The results of the mechanical integrity demonstration and the rework report for the well referenced above have been reviewed and found satisfactory. In accordance with permit conditions, Mosaic Potash Hersey, LLC of Hersey, Michigan is authorized to commence injection into this well.

Should you have any questions regarding the above information, feel free to contact Fredia Hardin at (312) 886-1493.

Sincerely yours,

 12/5/07  
Rebecca L. Harvey, Chief  
Underground Injection Control Branch



bcc: Fredia Hardin

12/5/07/Authorization to Inject Letter to MOSAIC POTASH HERSEY, LLC  
Hersey0002.AUT-on Fredia's F-Drive



*HH*  
12/5/07

Confirmation Report - Memory Send

Page : 001  
Date & Time: Dec-05-07 03:13pm  
Line 1 : +13128864235  
Machine ID : US EPA

Job number : 628  
Date : Dec-05 03:12pm  
To : 912318323349  
Number of pages : 001  
Start time : Dec-05 03:12pm  
End time : Dec-05 03:13pm  
Pages sent : 001  
Status : OK

Job number : 628

\*\*\* SEND SUCCESSFUL \*\*\*



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
REGIONS 5  
77 WEST JACKSON BOULEVARD  
CHICAGO, IL 60604-3590

DEC 05 2007

**CERTIFIED MAIL 7007 0710 0003 4406 5**  
**RETURN RECEIPT REQUESTED**

Mr. Robert Schweitzer  
Mosaic Potash Hersey LLC  
1395 135th Avenue  
Hersey, Michigan 49639

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Sincerely yours,

Rebecca L. Harvey, Chief  
Underground Injection Control Branch

OPTIONAL FORM 99 (7-90)

**FAX TRANSMITTAL**

# of pages 1

To: Robert Schweitzer From: Fredia Hardin  
Dept: Mosaic Potash Hersey Phone: (312) 886-1493  
Fax: (312) 832-3349 Fax: (312) 886-4235  
NSN 7540-01-317-7305 5000-101 GENERAL SERVICES ADMINISTRATION

**DI SECTION ATI REVIEW REPORT**

WELL NAME: KALWA 2082 PERMIT #: M1-133-36-0002  
 ASSIGNEE: PATRICK DATE: 12/4/07

Company name on MIT			<u>MOSAIC POTASH HERSEY, LLC</u>		
Is this the permittee?	<input checked="" type="radio"/> Yes	<input type="radio"/> No	N/A		
If "no", who is?					
Does the company name on the MIT match the well file info?	<input checked="" type="radio"/> Yes	<input type="radio"/> No			
If no, then a minor modification of the permit may be needed or the file may need to be updated for rule-authorized wells.					
Does the company name on the MIT match the database info?	<input checked="" type="radio"/> Yes	<input type="radio"/> No			
If "no", then the database needs to be updated via Clarissa to match the effective permit. If "yes" cross out the database update initial line at the bottom of this page.					

**FROM DATABASE OR WELL FILE**

Top of injection zone:	<u>5765</u>	Feet below ground surface
Packer depth in database:	<u>N/A</u>	<u>PACKERLESS COMPLETION</u>

**FROM MIT FORM**

Packer depth on MIT form:	<u>5815</u>	Feet below ground surface
Fluid returned after MIT:	<u>31.5</u>	gallons
Date of MIT :	<u>12/4/07</u>	Circle one: <input checked="" type="radio"/> Pass <input type="radio"/> Fail
Indicate type of rework:	Casing repair/squeeze job	
	Tubing/packer	
	Repaired through plugging	
<u>Patch at 2851'</u>	Other repair—specify: <u>AND NEW 7" CASING FROM 2851' TO SURFACE</u>	
	Not a repair (e.g. stimulation)--specify	
Assignee: If rework was done, the type must be indicated in the CIL-ATI SS. If this was not a repair, and there was no loss of MI, enter "no loss of MI" in the "CIL DATE IN" column.		

**FROM THE CIL/ATI SPREADSHEET:**

Date of loss of MI (enter N/A if no loss of MI—see above)	<u>11/7/07</u>
More than 90 days from loss of MI to MIT?	Yes <input type="radio"/> No <input checked="" type="radio"/> N/A

Is the packer depth within 100' from the top of the injection zone or deeper?	<input checked="" type="radio"/> Yes <input type="radio"/> No
If "no", the permittee must be notified that they need to reset the packer & retest.	
Was the new packer depth entered into the WELL DE for this well?	<input checked="" type="radio"/> Yes <input type="radio"/> No
Give this form with the MIT, inspection cover sheet, rework forms and supplied information to Fredia to create an Authorization To Inject letter.	

Technical review completed (initials)	<u>P.S.</u>	Date	<u>12/5/07</u>
Mail out completed (initials)		Date	
IF NEEDED: Well ownership updated in database (initials)		Date	



Mosaic Potash Hersey LLC  
1395 135th Avenue  
Hersey, MI 49639  
www.mosaicco.com

Tel 231-832-3755

December 5, 2007

Jeff McDonald  
Underground Injection Control Branch  
United States Environmental Protection Agency  
77 W. Jackson Blvd, WU-16J  
Chicago, IL 60604-3590

RE: MI-133-3G-A002  
MIT on Well KCL 2082 and authorization to resume injection

The Part 1 Mechanical Integrity Test was passed on Well 2082 on December 4, 2007. The EPA did not witness the MIT per your email dated 11/28/07. Mark Smith of the Michigan Department of Environmental Quality was present to witness the test. A signed copy of the DEQ Annular Pressure Test is enclosed for your reference. The USEPA Standard Annular Pressure Test form is attached along with the calibration certification for the pressure gauge that was used.

Well 2082 lost mechanical integrity on November 6, 2007. The well has not been injected since mechanical integrity was lost. The casing leak was repaired by installing a casing patch at 2851 feet and new 7" casing was run from the patch to surface. EPA Form 7520-12 is being prepared for the rework and will be sent to you by the end of the week. Injection of Well 2082 may not resume until we receive written authorization from the EPA to resume injection.

Please review the information submitted with this letter and, as soon as possible, authorize Mosaic Potash Hersey to resume injection of Well 2082.

If I can assist you with any additional information, please contact me at 231-832-1216.

Sincerely,

A handwritten signature in cursive script that reads "Robert Schweitzer".

Robert Schweitzer  
Mining and Production Superintendent  
Mosaic Potash Hersey

Cc: Raymond Vugrinovich, Michigan Department of Environmental Quality (no attachments)

Form Approved OMB No. 2040-0042 Expires 1/31/05

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
WASHINGTON, D.C. 20460**WELL REWORK RECORD****NAME AND ADDRESS OF PERMITTEE**Mosaic Potash Hersey  
1395 135th Ave  
Hersey, MI 49639**NAME AND ADDRESS OF CONTRACTOR**Mosaic Potash Hersey  
1395 135th Ave  
Hersey, MI 49639Locate Well and Outline Unit on  
Section Plat - 640 AcresSTATE  
MICOUNTY  
Osceola

PERMIT NUMBER

MI-133-3G-A002

**SURFACE LOCATION DESCRIPTION**

SE 1/4 of NW 1/4 of SW 1/4 of Sec 26 T17N R9W

LOCATE WELL IN TWO DIRECTIONS FROM NEAREST LINES OF QUARTER SECTION AND DRILLING UNIT

Surface

Location 1158 ft. From (N/S) N Line of Quarter SectionAnd 1319 ft. From (E/W) W Line of Quarter Section**WELL ACTIVITY**

- ☐ Brine Disposal  
☐ Enhanced Recovery  
☒ Solution Mining

Lease Name

Kalium 2082

Total Depth Before Rework

7678'

Total Depth After Rework

7678'

Date Rework Commenced

11/13/2007

Date Rework Completed

12/5/2007

**TYPE OF PERMIT**

- ☐ Individual  
☒ Area

Number of Wells \_\_\_\_\_

19

**WELL CASING RECORD - BEFORE REWORK**

Casing		Cement		Perforations		Acid or Fracture Treatment Record
Size	Depth	Sacks	Type	From	To	
13 3/8	893'	900	Class A			
9 5/8	5139'	2425	Class A			
7	7715'	680	Class H			

**WELL CASING RECORD - AFTER REWORK (Indicate Additions and Changes Only)**

Casing		Cement		Perforations		Acid or Fracture Treatment Record
Size	Depth	Sacks	Type	From	To	
7	7715	680	Class H			Casing patch Installed at 2851'

**DESCRIBE REWORK OPERATIONS IN DETAIL**

USE ADDITIONAL SHEETS IF NECESSARY

Set bridge plug at 5815'-Run packer in the hole to determine depth of the leak. Found leak at 6' below wellhead. Found I.D. restriction at 1460'. Cut 7 inch casing at 1520' and ran casing patch and new casing. Tested casing, still leaking. Pulled more tension on the casing patch. 7 inch seperated at 2850. Pull 7 inch casing and dress 7 inch for a new patch. Run new casing patch and casing. Patch at 2851'. Land wellhead slips and tested casing. Passed MIT. Test witnessed by Michigan DEQ Rep Mark Smith. Retrieve CIBP-Run 4 1/2 casing to 6000'

**WIRE LINE LOGS, LIST EACH TYPE**

Log Types

Logged Intervals

**CERTIFICATION**

I certify under the penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment. (Ref. 40 CFR 144.32)

NAME AND OFFICIAL TITLE

ROBERT SCHWEITZER  
PRODUCTION AND MINING SUPT.

SIGNATURE

Robert Schweitzer

DATE SIGNED

12/5/07





Mosaic Potash Hersey LLC  
1395 135<sup>th</sup> Avenue  
Hersey, MI 49639  
www.mosaicco.com

Tel 231-832-3755  
Fax 231-832-3349

## Fax

---

**DATE:** 12/5/07

**NUMBER OF PAGES  
INCLUDING COVER PAGE: 2**

**TO:** Patrick Saleh, US EPA Region 5

**CC:**

**FAX:** 312-886-4235

**FROM:** Bob Schweitzer

**SENDER'S PHONE:** 231-832-1216

**Re:** Permit MI-133-3G-A002 Well 2082 Rework Record

The Well Rework Record (EPA Form 7520-12) for the casing repair on Well 2082 is attached.

---

**CONFIDENTIALITY NOTE:** The information contained in this facsimile transmission is intended only for the personal and confidential use of the individual(s) or entity(ies) named above, and may include material that is privileged and confidential. Any dissemination, distribution or copying of this transmittal is strictly prohibited. If you have received this transmittal in error, please notify us immediately by telephone and return the original transmittal to us by mail. Thank you.



Mosaic Potash Hersey LLC  
1395 135<sup>th</sup> Avenue  
Hersey, MI 49639  
www.mosaicco.com

Tel 231-832-3755  
Fax 231-832-3349

## Fax

---

DATE: 12/5/07

NUMBER OF PAGES  
INCLUDING COVER PAGE: 2

TO: Patrick Saieh, US EPA Region 5

CC:

FAX: 312-886-4235

FROM: Bob Schweitzer

SENDER'S PHONE: 231-832-1216

Re: Permit MI-133-3G-A002 Well 2082 MIT

The cover letter that will be sent via FedEx today is attached for your reference. I will fax EPA Form 7520-12 (Well Rework Record) to you later today.

---

**CONFIDENTIALITY NOTE:** The information contained in this facsimile transmission is intended only for the personal and confidential use of the individual(s) or entity(ies) named above, and may include material that is privileged and confidential. Any dissemination, distribution or copying of this transmittal is strictly prohibited. If you have received this transmittal in error, please notify us immediately by telephone and return the original transmittal to us by mail. Thank you.

Fax Separator Page

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*****
*****
*****
***
***
***      From      231 832 3349      ***
***
***
***      Received time      Dec-05-07 09:38am      ***
***
***
***      Pages received      002      ***
***
*****
*****
*****
```

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
STANDARD ANNULAR PRESSURE TEST

Operator Mosaic Potash Hersey

State Permit No. 438

Address 1395 135th Ave

USEPA Permit No. MI-133-36-A002

HERSEY, MI 49639

Date of Test 12-4-2007

Well Name KALIUM 2082

Well Type III Seawater Mining

**LOCATION INFORMATION**

SE Quarter of the NW Quarter of the NW Quarter of Section 26; Range 17N; Township 9N1; County OSCEOLA;

Company Representative WILLIAM HECKS; Field Inspector NONE;

Type of Pressure Gauge Parascientific inch face; 0-3000 psi full scale; 0.000 psi increments;

New Gauge? Yes ☒ No ☐ If no, date of calibration 9/10/2007 Calibration certification submitted? Yes ☒ No ☐

**TEST RESULTS**

Readings must be taken at least every 10 minutes for a minimum of 30 minutes for Class II, III and V wells and 60 minutes for Class I wells.

For Class II wells, annulus pressure should be at least 300 psig. For Class I wells, annulus pressure should be the greater of 300 psig or 100 psi above maximum permitted injection pressure.

Original chart recordings must be submitted with this form.

5-year or annual test on time? Yes ☐ No ☐

2-year test for TA'd wells on time? Yes ☐ No ☐

After rework? Yes ☒ No ☐

Newly permitted well? Yes ☐ No ☐

Time	Pressure (in psig)	
	Annulus	Tubing
<u>11:35</u>	<u>1022.714</u>	<u>N/A</u>
<u>11:40</u>	<u>1021.516</u>	
<u>11:45</u>	<u>1019.912</u>	
<u>11:50</u>	<u>1018.423</u>	
<u>11:55</u>	<u>1017.385</u>	
<u>12:00</u>	<u>1016.124</u>	
<u>12:05</u>	<u>1014.956</u>	

Casing size 7" 23"

Tubing size 3 1/2" O.P.

Packer type CIBP

Packer set @ 5815'

Top of Permitted Injection Zone 5765'

Is packer 100 ft or less above top of

Injection Zone? Yes ☐ No ☐

If not, please submit a justification.

Fluid return (gal.) 31.5 Gallons

Comments:

Test Pressures: Max. Allowable Pressure Change: Initial test pressure x 0.03 30.68 psi  
Test Period Pressure change 7.758 psi

Test Passed ☒ Test Failed ☐

If failed test, well must be shut in, no injection can occur, and USEPA must be contacted within 24 hours. Corrective action needs to occur, the well retested, and written authorization received before injection can recommence.

I certify under penalty of law that this document and all attachments are, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations. (See 40 CFR 144.32(d))

WILLIAM C HECKS  
Printed Name of Company Representative

William C Hicks  
Signature of Company Representative

12-4-2007  
Date

## ANNULAR PRESSURE TEST

By authority of Part 615 or Part 625 of  
Act 451 PA 1994, as amended.  
Non-submission and/or falsification of this information  
may result in fines and/or imprisonment.

By authority of Part 615 or Part 625 of Act 451 PA 1994, as amended. Non-submission and/or falsification of this information may result in fines and/or imprisonment.		Permit Number <b>438</b>	
		Well name & No. <b>Kallum 2082</b>	
		Surface location <b>SE 1/4 of NW 1/4 of NW 1/4, Section 26 T 17N R 9W</b>	
Name and address of permittee  <b>Mosaic Potash Hersey</b> <b>1395 135<sup>th</sup> Ave</b> <b>Hersey, MI 49639</b>		Township County <b>Hersey Osceola</b>	
		Well type Part 615 <input type="checkbox"/> Secondary recovery <input type="checkbox"/> Brine disposal Part 625 <input type="checkbox"/> Waste disposal <input checked="" type="checkbox"/> Solution mining	
Date of test <b>12/4/2007</b>		Casing <b>7 inch 23#</b>	Tubing <b>3 1/2 inch Drill Pipe</b>
Type of gauge <b>Paroscientific</b>  inch face <b>Digital</b> psi range <b>0-3000#</b>		Packer type/model	Packer depth
New gauge <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No If no, enter date of test calibration		Type of non-corrosive liquid in the annulus	
Average rate during injection		Maximum allowed injection pressure	

### TEST DATA

[illegible]

## Comments

Certification if witnessed by DEQ representative:

Signature of DEQ employee

Myself D. Smith

Date \_\_\_\_\_

12-4-67

Certification if not witnessed by DEQ representative: "I state that I am authorized by said owner. This report was prepared under my supervision and direction. The facts stated herein are true, accurate and complete to the best of my knowledge."

Signature

Date \_\_\_\_\_

MAIL TO: OFFICE OF GEOLOGICAL SURVEY  
MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY

## CERTIFICATE OF CONFORMANCE

CUSTOMER:

PHE-CS-HERSHEY CENTRAL STOREROOM

PURCHASE ORDER:

U115262

TRANSDUCER MODEL:

765-3K

PART NUMBER:

1100-019-0

SERIAL NUMBER(S):

105210

*PAROSCIENTIFIC INCORPORATED certifies that the part(s) identified above complies with the requirements of the above order and has been manufactured in accordance with engineering drawings, material and process specifications, testing procedures, and applicable specification drawing of Paroscientific Incorporated. The transducer(s) identified has been calibrated and tested over the specified pressure and temperature range and meets the requirements of the applicable specification drawing. Primary pressure, temperature standards and transfer standards used at Paroscientific Incorporated for calibration and testing have traceability to the National Institute of Standards and Technology and are regularly checked and calibrated according to Paroscientific QA Procedure Q8521, Inspection Test and Measurement Equipment, in accordance with the requirements of ISO 9001:2000.*



AUTHORIZED SIGNATURE

Warren Schuchman, Quality Assurance

9/10/07

DATE



**Technology**

Precision Pressure Instrumentation

Document no. T8148, Rev "AF", 16Apr07 page 1 of 2



## CERTIFICATION OF TRACEABILITY TO NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY

*Primary pressure and temperature standards used in the calibration and testing of Paroscientific pressure transducers or Meteorological Systems have traceability to the National Institute of Standards and Technology through the following documentation.*

### Bell and Howell Primary Pressure Standard:

Bell and Howell, Model 6-201-0001, Piston/Cylinder P2-919/C2-1523 via DH Calibration Report No. 15441 and 16653 traceable to NIST. Weight Set 1, P/N 6-002-0002, via DH Calibration Report No. 14481 and 16654 traceable to NIST. Weight Set 2, P/N 6-002-0002, via DH Calibration Report No. 14576, 16603, 31227 and 39628 traceable to NIST. Piston/Cylinder P2-652/C2-1378 via DH Instruments Calibration Report No. 14575, 16602, 31226 and 39627 traceable to NIST. Piston/Cylinder P1-231/C1-384 via DH Instruments Calibration Report No. 13170 traceable to NIST. Piston/Cylinder P/N 6-201, No. P1-949/C1-922, via DH Instruments Calibration Report 17176 and 17445, traceable to NIST.

### DH Primary Pressure Standard, Oil Operated Gauge:

DH Instruments, Model 5306, Piston/Cylinder S/N 3375, via DH Calibration Certificate Report No. 8398, 22146, 32354 and 45306 traceable to NIST. Piston/Cylinder 3511 via DH Calibration Report No. 8399, 22147, 32353 and 45307 traceable to NIST. Mass Set S/N 2032 via DH Calibration Report No. 24809, 24826, 45305 and 45308 traceable to NIST.

### DH Primary Pressure Standard, Pneumatic Operated Gauge:

DH Instruments, Model 5203, Piston/Cylinder S/N 4845, via DH Calibration Certificate No. 8541, 27161 and 38275 traceable to NIST. Mass Set S/N 2032/3293 via DH Calibration Certificate Nos. 4630, 24809, 8540, 32142, and 45305 traceable to NIST.

### DH Primary Pressure Standard, Pneumatic Operated Gauge:

DH instruments, Model PG7601 via DH Instruments Calibration No. 32162 and 41492 traceable to NIST. Piston/Cylinder S/N 305 via DH Instruments Calibration No. 20281, 32161 and 41490 traceable to NIST. DH Instruments 35 kg Mass Set No. 2052 and Bell No. 261A via DH Instruments Calibration Report No. 20282, 32163, 32164, 41491 and 41493 traceable to NIST.

### Hart Scientific Precision Thermometer (MET3A only):

Hart Scientific, Black Stack Model 1560 Serial Number A34523, PRT Scanner Model 2562 Serial number A34523, traceable to NIST via report number A4707031, Temperature Probe Model A1959 Serial Numbers 4424A-02, 4424A-04, 4424A-05, 4424A-06 and 5177C-02 traceable to NIST via report numbers 196a-06, 198a-06, 199a-06, 200a-06 and 183a-06.



**Technology**

**Precision Pressure Instrumentation**

Document no. T8148, Rev "AF", 16Apr07 page 2 of 2

## CERTIFICATE OF CALIBRATION

TRANSDUCER MODEL: 765-3K

SERIAL NUMBER: 105210

The Paroscientific transducer(s) identified above has been calibrated and tested with one or more of the following primary pressure and temperature standards. All have traceability to the National Institute of Standards and Technology.

### Bell and Howell Primary Pressure Standard

Pneumatic Absolute or Gauge Dead Weight Tester Part Number: 6-201-0001, S/N 4034 and S/N 1014

— Piston/Cylinder: 6-001-0002, P2-919/C2-1523,

Weight Set 1: 6-002-0002

Range: 1.5 to 50 psi [10 to 345 kPa]

Accuracy: 0.010 percent of reading

✓ Piston/Cylinder: 6-001-0002, P2-652/C2-1378,

Weight Set 2: 6-002-0002

Range: 1.5 to 50 psi [10 to 345 kPa]

Accuracy: 0.010 percent of reading

— Piston/Cylinder: 6-001-0001, P1-949/C1-922,

Weight Set 2: 6-002-0002

Range: 0.3 to 5 psi [2 to 34 kPa]

Accuracy: 0.015 percent of reading

### DH Primary Pressure Standard

Pneumatic Absolute or Gauge Dead Weight Tester Part Number: PG7601 S/N 161

— Piston/Cylinder: S/N 305, Mass Set: S/N 2052

Range: 0.7 to 50 psi [5 to 345 kPa] absolute mode, 0.29 to 50 psi [2 to 345 kPa] gauge mode

Accuracy: 0.002 percent of reading

### DH Primary Pressure Standard

Pneumatic Gauge Dead Weight Tester, Model 5203, S/N 5557

— Piston/Cylinder: S/N 4845, Mass Sets: S/N 2032, S/N 3293

Range: 20 to 1,600 psi [0.14 to 11 MPa]

Accuracy: 0.005 percent of reading

### DH Primary Pressure Standard

Oil Operated Gauge Dead Weight Tester, Model 5306, S/N 3505

✓ Piston/Cylinder: S/N 3375, Mass Set: S/N 2032

Range: 40 to 20,000 psi [0.3 to 138 MPa]

Accuracy: 0.01 percent of reading above 200 psi [1.4 MPa]

or 0.02 psi [0.14 kPa] at lower pressure

— Piston/Cylinder: S/N 3511, Mass Set: S/N 2032

Range: 145 to 72,500 psi [1 to 500 MPa]

Accuracy: 0.02 percent of reading above 725 psi [5 MPa]

or 0.145 psi [1 kPa] at lower pressure

### Hart Scientific Precision Thermometer (MET3A only)

— Black Stack model 1560 S/N 97568, PRT Scanner model 2562 S/N A34523, Temperature Probe Model A1959:

S/Ns 4424A-02, 4424A-04, 4424A-05, 4424A-06 and 5177C-02.

Range: -50° to 60° C.

Accuracy: .015°C.

Tested By: 



DATE 9-10-07



**Paroscientific, Inc.**  
**Pressure Instrument Configuration**

SN: 105210 Part Number: 1100-019-0 Model: 765-3K Port: Oil Filled

Calibration Date: 10-Sep-07 Report No: 7548 Technician: WMR

Pressure Range: 0 to 3,000 psia Temperature Range: 0 to +40 deg C

Customer: PHE-CS-Hershey Central Storeroom

Report Date: 10-Sep-07

Address : 1395 135th Avenue

Sales Order: 24626

Hersey, MI 49639 USA

S/R Number :

Configuration		Calibration Coefficients	
BL: 0	PT: N	U0: 5.813680 $\mu$ sec	
BR: 9600	QD: -	Y1: -3958.154 deg C / $\mu$ sec	
DD: -	QO: -	Y2: -13865.89 deg C / $\mu$ sec <sup>2</sup>	
DL: 0	SL: -	Y3: -138805.8 deg C / $\mu$ sec <sup>3</sup>	
DM: 0	SN: 105210	C1: -14414.57 psi	
DO: -	ST: -	C2: -99.30154 psi / $\mu$ sec	
DP: 6	SU: 0	C3: 48299.55 psi / $\mu$ sec <sup>2</sup>	
ID: 01	TI: 670	D1: 0.0446906	
IM: -	TR: 952	D2: 0.0000000	
LL: -	TU: 0	T1: 30.00206 $\mu$ sec	
LH: -	UF: 1.000000	T2: 0.820646 $\mu$ sec / $\mu$ sec	
MC: Y	UL: -	T3: 54.13041 $\mu$ sec / $\mu$ sec <sup>2</sup>	
MD: 1	UM: USER	T4: 71.54495 $\mu$ sec / $\mu$ sec <sup>3</sup>	
MN: 765-3K	UN: 1	T5: 2095.804 $\mu$ sec / $\mu$ sec <sup>4</sup>	
OP: -	US: 0	TC: 0.6781528	
PF: 3000.000	VR: P1.06	PA: 0.0000000	
PI: 670	ZI: 0	PM: 1.0000000	
PL: 3600.000	ZS: 0		
PO: 0	ZL: 0		
PR: 238	ZV: .0000000		
PS: 0			
AL: .0000000			
AU: 3000.000			
GD: 0			
GT: 0			
LW: 0			
PC: 1.000000			
PX: 5			
RS: 1			
RU: 0			

Paroscientific, Inc.

4500 148th Ave. N.E. Redmond, WA 98052

Phone: (425)883-8700 Fax: (425)867-5407

Web: <http://www.paroscientific.com>

Email: [support@paroscientific.com](mailto:support@paroscientific.com)

Prepared by

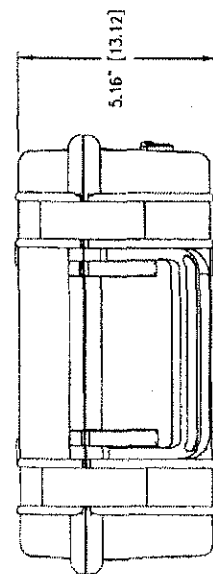
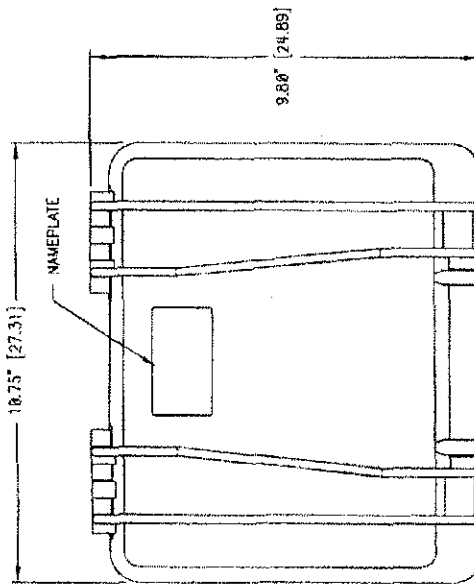


Technology

# SPECIFICATION CONTROL DRAWING

## NOTES

1. MAXIMUM TORQUE ON VCO PRESSURE FITTING IS 75 IN-LB (8.47 N-M). MAXIMUM TORQUE ON HIP PRESSURE FITTING IS 25 FT-LB (33.9 N-M).
2. REFER TO OPERATION MANUAL (DOC B085-001) FOR OPERATING INSTRUCTIONS.
3. CAUTION: UNIT IS A SCIENTIFIC INSTRUMENT. EXCESSIVE SHOCK MAY CAUSE PERMANENT DAMAGE. HANDLE WITH CARE.
4. ACCESSORIES INCLUDE: USB INTERFACE CABLE, OPERATING MANUAL, UNIVERSAL AC ADAPTER, DIGIQUARTZ® LIBRARY CD, AND LAMINATED MENU CARD. ALL VCO UNITS SHIPPED WITH 1/4" TUBING ADAPTER(S).
5. OIL-FILLED UNITS ARE FILLED UNDER VACUUM BY THE MANUFACTURER WITH DOW-CORNING FS 1265 FLUID. (AT 25°C, SPECIFIC GRAVITY = 1.25 AND VISCOSITY = 300 CENTISTOKES).
6. CAUTION: DO NOT APPLY VACUUM OR GAS TO OIL-FILLED PRESSURE PORTS. OIL COULD BE WITHDRAWN, PERMITTING PRESSURE MEDIUM TO COME INTO CONTACT WITH SENSING ELEMENTS.
7. RS-232 PORT MEETS EIA/TIA-232 SPECIFICATIONS.
8. PRODUCT IS CE CERTIFIED.



## OVERALL DIMENSIONS

## STANDARD PRODUCT

MODEL NO.	PART NO.	PRESSURE RANGE	ACCURACY	OPERATING TEMP RANGE	MATING FITTING
765-15A	1100-001	0-15 PSIA (0.10 MPa)	0.002% OF F.S. OR BETTER	-20 °C TO +50 °C (-4 °F TO +122 °F)	1/4" SWAGelok VCO
765-16B	1100-010	0-16 PSIA (0.11 MPa)	±0.08 MPa OR BETTER		
765-23A	1100-002	0-23 PSIA (0.16 MPa)			
765-30A	1100-003	0-30 PSIA (0.21 MPa)			
765-45A	1100-004	0-45 PSIA (0.31 MPa)		0.008% OF F.S. OR BETTER	HIP: GLAND 60-2H4 COLLAR 60-2H4 OR AUTOCLAVE: GLAND AQL(40) COLLAR AQL(40) NIPPLE AP(40)
765-100A	1100-005	0-100 PSIA (0.69 MPa)			
765-200A	1100-006	0-200 PSIA (1.38 MPa)			
765-300A	1100-007	0-300 PSIA (2.07 MPa)			
765-400A	1100-008	0-400 PSIA (2.75 MPa)			
765-500A	1100-009	0-500 PSIA (3.45 MPa)			
765-15G	1100-011	0-15 PSIG (0.10 MPa)			
765-22G	1100-012	0-22 PSIG (0.15 MPa)			
765-30G	1100-013	0-30 PSIG (0.21 MPa)			
765-100G	1100-014	0-100 PSIG (0.69 MPa)			
765-150G	1100-015	0-150 PSIG (1.03 MPa)			
765-200G	1100-016	0-200 PSIG (1.38 MPa)			
765-1K	1100-017-0	0-1000 PSIA (6.89 MPa)			
765-2K	1100-018-0	0-2000 PSIA (13.8 MPa)			
765-3K	1100-019-0	0-3000 PSIA (20.7 MPa)			
765-6K	1100-020-0	0-6000 PSIA (41.4 MPa)			
765-10K	1100-021-0	0-10000 PSIA (68.9 MPa)		0 °C TO +40 °C (32 °F TO +104 °F)	1/4" SWAGelok VCO
765-15K	1100-022-0	0-15000 PSIA (103 MPa)			
765-20K	1100-023-0	0-20000 PSIA (138 MPa)			
765-30K	1100-024-0	0-30000 PSIA (207 MPa)			
765-48K	1100-025-0	0-40000 PSIA (276 MPa)		0.02% OF F.S. OR BETTER	
765-30	1100-026	0-3 PSID (0.020 MPa)			
765-60	1100-027	0-6 PSID (0.041 MPa)			
765-180	1100-028	0-18 PSID (0.12 MPa)			

ADD "-0" FOR OIL-FILLED, 1K PSIA TO 40K PSIA ONLY

## PERFORMANCE

ACCURACY RELATIVE TO THE PRIMARY STANDARD INCLUDES RESOLUTION, HYSTERESIS, NON-REPEATABILITY, AND NON-CONFORMANCE ..... SEE TABLE

## DIFFERENTIAL MODELS:

COMMON MODE ERROR ..... <0.0005% OF F.S./PSI OF COMMON MODE PRESSURE  
COMMON MODE PRESSURE, MAX ..... 1200 PSI

## CHARACTERISTICS

WEIGHT ..... 8.5 LB (3.86 KG) TYPICAL

POWER REQUIREMENTS (WITH SUPPLIED AC ADAPTER) ..... 100-240 VAC, 47-63 Hz  
(OPERATES UP TO 150 HOURS ON BUILT-IN RECHARGEABLE BATTERY)

DISPLAY IS 16 CHARACTER X 2 ROW LCD WITH .32 IN. HIGH CHARACTERS.

## ENVIRONMENTAL

OVERPRESSURE ..... 1.2 TIMES FULL SCALE  
MODEL 765-500A ..... 1.8 TIMES FULL SCALE  
MODELS 765-30K AND 765-48K ..... 1.1 TIMES FULL SCALE

OPERATING TEMPERATURE RANGE ..... SEE TABLE

AC ADAPTER OPERATING TEMPERATURE RANGE ..... 0 °C TO +40 °C (32 °F TO +104 °F)

STORAGE TEMPERATURE RANGE ..... -20 °C TO +80 °C (-4 °F TO +176 °F)

## CURRENT APPROVALS

NAME	DATE	NAME	DATE
DR R.M. Collado	11/22/06	DR D. Tolson	12/10/06
CHK J. H. H. H.	11/22/06	CHK J. H. H. H.	12/10/06
DR J. H. H. H.	11/22/06	DR J. H. H. H.	12/10/06

## DESCRIPTION

DIGIQUARTZ®  
PORTABLE PRESSURE STANDARD,  
MODEL 765

SIZE	QAGE	DOCUMENT NUMBER	REV
A	54535	7833-001	0
SCALE	NONE	SHEET	1 OF 2

REGISTERED TRADEMARK OF PAROSCIENTIFIC, INC.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
WASHINGTON, D.C. 20460**WELL REWORK RECORD****NAME AND ADDRESS OF PERMITTEE**Mosaic Potash Hersey  
1395 135th Ave  
Hersey, Mi 49639**NAME AND ADDRESS OF CONTRACTOR**Mosaic Potash Hersey  
1395 135th Ave  
Hersey, Mi 49639Locate Well and Outline Unit on  
Section Plat - 640 Acres

STATE

MI

COUNTY

Osceola

PERMIT NUMBER

MI-133-3G-A002

**SURFACE LOCATION DESCRIPTION**

SE 1/4 of NW 1/4 of SW 1/4 of Sec 26 T17N R9W

LOCATE WELL IN TWO DIRECTIONS FROM NEAREST LINES OF QUARTER SECTION AND DRILLING UNIT

Surface

Location 1158 ft. From (N/S) N Line of Quarter Section

And 1319 ft. From (E/W) W Line of Quarter Section

**WELL ACTIVITY**

- ☐ Brine Disposal
- ☐ Enhanced Recovery
- ☒ Solution Mining

Lease Name

Kalium 2082

Total Depth Before Rework

7678'

Total Depth After Rework

7678'

Date Rework Commenced

11/13/2007

Date Rework Completed

12/5/2007

**TYPE OF PERMIT**☐ Individual☒ Area

Number of Wells \_\_\_\_\_

19

**WELL CASING RECORD - BEFORE REWORK**

Casing		Cement		Perforations		Acid or Fracture Treatment Record
Size	Depth	Sacks	Type	From	To	
13 3/8	893'	900	Class A			
9 5/8	5139'	2425	Class A			
7	7715'	680	Class H			

**WELL CASING RECORD - AFTER REWORK (Indicate Additions and Changes Only)**

Casing		Cement		Perforations		Acid or Fracture Treatment Record
Size	Depth	Sacks	Type	From	To	
7	7715	680	Class H			Casing patch installed at 2851'

**DESCRIBE REWORK OPERATIONS IN DETAIL**

USE ADDITIONAL SHEETS IF NECESSARY

Set bridge plug at 5815'-Run packer in the hole to determine depth of the leak. Found leak at 6' below wellhead. Found I.D. restriction at 1460'. Cut 7 inch casing at 1520' and ran casing patch and new casing. Tested casing, still leaking. Pulled more tension on the casing patch. 7 inch separated at 2850. Pull 7 inch casing and dress 7 inch for a new patch. Run new casing patch and casing. Patch at 2851'. Land wellhead slips and tested casing. Passed MIT. Test witnessed by Michigan DEQ Rep Mark Smith. Retrieve CIBP-Run 4 1/2 casing to 6000'

**WIRE LINE LOGS, LIST EACH TYPE**

Log Types

Logged Intervals

**CERTIFICATION**

I certify under the penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment. (Ref. 40 CFR 144.32)

NAME AND OFFICIAL TITLE

ROBERT SCHWEITZER  
PRODUCTION AND MINING SUPT.

SIGNATURE

Robert Schweitzer

DATE SIGNED

12/5/07

## ANNULAR PRESSURE TEST

By authority of Part 615 or Part 625 of  
Act 451 PA 1994, as amended.  
Non-submission and/or falsification of this information  
may result in fines and/or imprisonment.

By authority of Part 615 or Part 625 of Act 451 PA 1994, as amended, Non-submission and/or falsification of this information may result in fines and/or imprisonment.		Permit Number <b>438</b>	
		Well name & No. <b>Kalium 2082</b>	
		Surface location <b>SE 1/4 of NW 1/4 of NW 1/4, Section 26 T 17N R 9W</b>	
Name and address of permittee  <b>Mosaic Potash Hersey</b> <b>1395 135<sup>th</sup> Ave</b> <b>Hersey, Mi 49639</b>		Township County <b>Hersey Osceola</b>	
		Well type  Part 615 <input type="checkbox"/> Secondary recovery <input type="checkbox"/> Brine disposal Part 625 <input type="checkbox"/> Waste disposal <input checked="" type="checkbox"/> Solution mining	
Date of test <b>12/4/2007</b>		Casing Tubing <b>7 inch 23# 3 1/2 inch Drill Pipe</b>	
Type of gauge <b>Paroscientific</b>		Packer type/model Packer depth	
inch face <b>Digital</b> psi range <b>0-3000#</b>			
New gauge <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No If no, enter date of test calibration		Type of non-corrosive liquid in the annulus	
Average rate during injection		Maximum allowed injection pressure	

## TEST DATA

[illegible]

Comments

Certification if witnessed by DEQ representative:

Signature of DEQ employee

Date \_\_\_\_\_

Certification if not witnessed by DEQ representative: "I state that I am authorized by said owner. This report was prepared under my supervision and direction. The facts stated herein are true, accurate and complete to the best of my knowledge."

Signature

Date \_\_\_\_\_

MAIL TO: OFFICE OF GEOLOGICAL SURVEY  
MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY





JENNIFER M. GRANHOLM  
GOVERNOR

STATE OF MICHIGAN  
DEPARTMENT OF ENVIRONMENTAL QUALITY  
LANSING



STEVEN E. CHESTER  
DIRECTOR  
RECEIVED

September 22, 2006

SEP 29 2006

UIC BRANCH  
EPA REGION 5

Mr. Bob Sweitzer  
Minefield Supervisor  
Mosaic Potash Hersey LLC  
1395 135th Ave.  
Hersey, Michigan 49639

Dear Mr. Sweitzer:

SUBJECT: Mechanical Integrity Testing, Kalium 2031, Permit No. 383-914-767

As required by R 299.2391(2) of the administrative rules promulgated under authority of Part 625, Mineral Wells, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended (NREPA), on Friday, September 22, 2006, mechanical integrity testing on the subject well was conducted. A bridge plug has been set in the well at 6801 feet and cement placed on top of the bridge plug prior to converting the well to mine the Salina F Unit salt. The top of the cement was tagged at 6670 feet. The casing has been under pressure since last week, according to Mr. Bill Hicks of Mosaic, USA. Internal mechanical integrity of the 7-inch long string casing was demonstrated using a pressure test. I witnessed the test for the Michigan Department of Environmental Quality. The test was not witnessed by a representative of the United States Environmental Protection Agency. I recorded the following pressures:

<u>Time</u>	<u>Annulus Pressure (psig)</u>
08:59	951.817
09:04	951.814
09:09	951.814
09:13	951.811
09:18	951.808
09:23	951.792
09:28	951.779
09:33	951.769
09:38	951.758
09:43	951.751
09:48	951.748
09:53	951.743
09:59	951.743

Pressure was measured by a Paroscientific 0 - 2000 psi digital quartz pressure standard, model 760-2K, serial number 54710, last calibration 5/14/1999, supplied by Mosaic USA, LLC.

Mr. Bob Sweitzer  
Page 2  
September 22, 2006

The test well appears to demonstrate internal mechanical integrity as required by R 299.2391(2) of the NREPA.

If you have any questions about the above, please contact me.

Sincerely,

A handwritten signature in black ink, reading "Raymond Vugrinovich". The signature is fluid and cursive, with a large loop at the end of the last name.

Raymond Vugrinovich  
Senior Geologist  
Minerals and Mapping Unit  
Office of Geological Survey  
517-241-1532

cc: Ms. Lisa Perenchio, Chief, Direct Implementation Section, U.S. EPA  
Mr. Rick Henderson, DEQ  
Mr. Mel Kiogima, DEQ

**ANNULAR PRESSURE TEST**

By authority of Part 615 or Part 625 of  
Act 451 PA 1994, as amended.  
Non-submission and/or falsification of this information  
may result in fines and/or imprisonment.

Name and address of permittee <b>Mosaic USA LLC</b> <b>1395 135th Avenue</b> <b>Hersey, MI 49639</b>	Permit Number <b>383-914-76 MI-133-3G-A0002</b>	
	Well name & No. <b>Kalium 2031</b>	
	Surface location <b>1/4 of NE 1/4 of SW 1/4, Section 26 T 17N R 09W</b>	
	Township <b>Hersey</b>	County <b>Osceola</b>
	Well type Part 615 <input type="checkbox"/> Secondary recovery <input type="checkbox"/> Brine disposal Part 625 <input type="checkbox"/> Waste disposal <input checked="" type="checkbox"/> Solution mining	
Date of test <b>10/22/2006</b>	Casing <b>7" 23# N-80 @ 7808 feet</b>	Tubing <b>None</b>
Type of gauge <b>PAROSCIENTIFIC DIGITAL QUARTZ PRESSURE STANDARD, MODEL 760-2K SN 5470</b>	Packer type/model <b>None</b>	Packer depth
Inch face psi range <b>0-2000</b>		
New gauge <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No if no, enter date of test calibration	Type of non-corrosive liquid in the annulus <b>No annulus</b>	
Average rate during injection	Maximum allowed injection pressure	

**TEST DATA**

Pressure readings (psig)					
Time	Annulus	tubing	Time	Annulus	tubing
0859	951.817				
0904	951.814				
0909	951.814				
0913	951.811				
0918	951.808				
0923	951.792				
0928	951.779				
0933	951.769				
0938	951.758				
0943	951.751				
0948	951.748				
0953	951.743				
0959	951.743				

## Comments

**Well was plugged back to prepare for mining of Salina F Unit salt; bridge plug at 6801 feet - cement on top; top of cement tagged at 6670 feet.**

Certification if witnessed by DEQ representative:

Signature of DEQ employee

Date

9/22/2006

Certification if not witnessed by DEQ representative: "I state that I am authorized by said owner. This report was prepared under my supervision and direction. The facts stated herein are true, accurate and complete to the best of my knowledge."

Signature

Date

MAIL TO: OFFICE OF GEOLOGICAL SURVEY  
MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY  
PO BOX 30256  
LANSING MI 48909-7756

## CERTIFICATE OF CONFORMANCE

CUSTOMER: IMC KALIUM, LTD.

PURCHASE ORDER: N/A  
TRANSDUCER MODEL: 760-2K  
PART NUMBER: 1107-033-0  
SERIAL NUMBER(S): 54710

PAROSCIENTIFIC INCORPORATED certifies that the part(s) identified above complies with the requirements of the above order and has been manufactured in accordance with engineering drawings, material and process specifications, testing procedures, and applicable specification drawing of Paroscientific Incorporated. The transducer(s) identified has been calibrated and tested over the specified pressure and temperature range and meets the requirements of the applicable specification drawing. Primary pressure standards and transfer standards used at Paroscientific Incorporated for calibration and testing have traceability to the National Institute of Standards and Technology and are regularly checked and calibrated according to Paroscientific QA Procedure Q8521, Inspection Test and Measurement Equipment, in accordance with the requirements of ISO 9001.

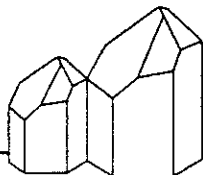
*Donald H. Hanson*

AUTHORIZED SIGNATURE

5/14/99

DATE

Donald H. Hanson, Director of Engineering and Quality Assurance



Digiquartz® Pressure Instrumentation

Document No. T8148, Rev."J", 9Feb99

Page 1 of 2

PAROSCIENTIFIC, INC.  
4500 148th Ave. N.E.  
Redmond, WA 98052  
Tel: (425) 883-8700  
Fax: (425) 867-5407

Customer: IMC KALIUM LTD.  
1395 135TH AVENUE  
HERSEY, MI 49639

Date: 04-09-1999

Sales Order: 15583 S/R 5758

STATUS REPORT OF INTELLIGENT TRANSMITTER  
-----

Serial Number: 54710  
Model: 760-2K  
Pressure Range: 0 to 2000 psia  
Port: oil filled

Configuration  
-----

Calibration Coefficients  
-----

VR: 60.07	PA: .0000000
SN: 54710	PM: 1.0000000
ID: 01	TC: .6890874
BR: 9600	
PT: N	U0: 5.889979
	Y1: -3914.328
DP: 6	Y2: -12187.81
	Y3: -72768.38
MD: 1	
MC: Y	C1: -8358.509
	C2: -626.9729
UN: 1	C3: 19397.85
UF: 1.0000000	
PR: 00238	D1: .0538819
TR: 00952	D2: .0000000
OP: 2100.000	T1: 29.98964
ZS: 0	T2: -.0372625
ZV: .00000000	T3: 47.63067
	T4: 73.49568
	T5: 729.2003

Prepared by: T.Chau

CERTIFICATION OF TRACEABILITY  
TO  
NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY

Primary pressure standards used in the calibration and testing of Paroscientific pressure transducers have traceability to the National Institute of Standards and Technology through the following documentation.

Bell and Howell Primary Pressure Standard:

Bell and Howell, Model 6-201-0001, Piston/Cylinder P2-919/C2-1523 via DH Calibration Report No. 15441, traceable to NIST via test report numbers M4212 and 822/255136-95. Weight Set 1, P/N 6-002-0002, via DH Calibration Report No. 14481, traceable to NIST via test report numbers M4212, TN-251820-93 and 822/255136-95. Weight Set 2, P/N 6-002-0002, via DH Calibration Report No. 14576, traceable to NIST via test report numbers M4212, TN-251820-93 and 822/255136-95. Piston/Cylinder P2-652/C2-1378 via DH Instruments Calibration Report No. 14575, traceable to NIST via test report numbers M4212 and 822/255136-95. Piston/Cylinder P1-231/C1-384 via DH Instruments Calibration Report No. 13170, traceable to NIST. Piston/Cylinder P/N 6-201, No. P1-949/C1-922, via DH Instruments Calibration Report 15440, traceable to NIST via test reports M4212 and 822/255136-95.

DH Primary Pressure Standard, Oil Operated Gauge:

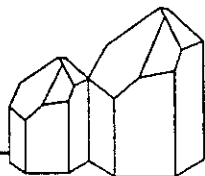
DH Instruments, Model 5306, Piston/Cylinder S/N 3375, via DH Calibration Certificate No. 8398 via National Bureau of Standards Reports M4212 and 822/255136-95. Piston/Cylinder 3511 via DH Calibration Report No. 8399 and via NIST reports M4212 and 822/255136-95. Mass Set S/N 2032 via DH Calibration Report No. 4630 and via test report numbers M4212, TN-251820-93 and 822/255136-95.

DH Primary Pressure Standard, Pneumatic Operated Gauge:

DH Instruments, Model 5203, Piston/Cylinder S/N 4845, via DH Calibration Certificate No. 8541, via National Bureau of Standards Reports M4212 and 822/255136-95. Mass Set S/N 2032/3293 via DH Calibration Certificate Nos. 4630 and 8540 and via National Bureau of Standards Reports M4212, TN-251820-93 and 822/255136-95.

DH Primary Pressure Standard, Pneumatic Operated Gauge:

DH instruments, Model PG7601, Piston/Cylinder S/N 305 via DH Instruments Calibration No. 7168, traceable to NIST via test reports M4212, TN-251820-93 and 822/255136-95. DH Instruments 35 kg Mass Set No. 2052 via DH Instruments Calibration Report No. 7210, via traceable to NIST via test reports M4212, TN-251820-93 and 822/255136-95.





## CERTIFICATE OF CALIBRATION

TRANSDUCER MODEL: 760-2K

SERIAL NUMBER: 54710

The Paroscientific transducer(s) identified above has been calibrated and tested with one or more of the following primary pressure standards. All have traceability to the National Institute of Standards and Technology.

### Bell and Howell Primary Pressure Standard

Pneumatic Absolute or Gauge Dead Weight Tester

Part Number: 6-201-0001, S/N 4034 and S/N 1014

— Piston/Cylinder: 6-001-0002, P2-919/C2-1523, Weight Set 1: 6-002-0002  
Range: 1.5 to 50 psi [10 to 345 kPa]

✓ Accuracy: 0.010 percent of reading

— Piston/Cylinder: 6-001-0002, P2-652/C2-1378, Weight Set 2: 6-002-0002  
Range: 1.5 to 50 psi [10 to 345 kPa]

— Accuracy: 0.010 percent of reading

— Piston/Cylinder: 6-001-0001, P1-949/C1-922, Weight Set 2: 6-002-0002  
Range: 0.3 to 5 psi [2 to 34 kPa]

— Accuracy: 0.015 percent of reading

### DH Primary Pressure Standard

Pneumatic Absolute or Gauge Dead Weight Tester

Part Number: PG7601 S/N 161

— Piston/Cylinder: S/N 305, Mass Set: S/N 2052

Range: 0.7 to 50 psi [5 to 345 kPa] absolute mode, 0.29 to 50 psi [2 to 345 kPa] gauge mode  
Accuracy: 0.002 percent of reading

### DH Primary Pressure Standard

Pneumatic Gauge Dead Weight Tester, Model 5203, S/N 5557

— Piston/Cylinder: S/N 4845, Mass Sets: S/N 2032, S/N 3293  
Range: 20 to 1,600 psi [0.14 to 11 MPa]

— Accuracy: 0.005 percent of reading

### DH Primary Pressure Standard

Oil Operated Gauge Dead Weight Tester, Model 5306, S/N 3505

✓ Piston/Cylinder: S/N 3375, Mass Set: S/N 2032

Range: 40 to 20,000 psi [0.3 to 138 MPa]

Accuracy: 0.01 percent of reading above 200 psi [1.4 MPa]  
or 0.02 psi [0.14 kPa] at lower pressure

— Piston/Cylinder: S/N 3511, Mass Set: S/N 2032

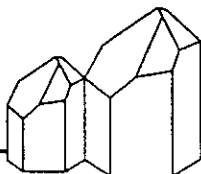
Range: 145 to 72,500 psi [1 to 500 MPa]

Accuracy: 0.02 percent of reading above 725 psi [5 MPa]  
or 0.145 psi [1 kPa] at lower pressure

Tested By: 

Document No. 8145-001, Rev. F 10/17/97

Date: 5-14-99





UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION 5  
77 WEST JACKSON BOULEVARD  
CHICAGO, IL 60604-3590

DEC 22 2004

DEC 22 2004

REPLY TO THE ATTENTION OF:

WU-16J

CERTIFIED MAIL 7001 0320 0006 1560 5163  
RETURN RECEIPT REQUESTED

Mr. Robert Schweitzer  
IMC Potash Hersey  
1395 135th Avenue  
Hersey, Michigan 49639



Subject: Results of Water-Brine Interface Test of Well # 1054 in June of 2004  
United States Environmental Protection Agency permit MI-133-3G-A002

Dear Mr. Schweitzer:

Region 5's Underground Injection Control Branch has reviewed the results of the water-brine interface test of Well #1054 which was completed on July 3, 2004. The test was conducted properly and our analyses confirms the conclusions presented.

The procedures used resulted in collection of usable data. We have reviewed these data and find that the purposes of the regulations or permit conditions requiring these tests appear to have been met. However, much of the data that must have been collected were not reported. Time and pressure data corresponding to empty spaces on the enclosed form (History of Brine Displacement and Pressure Change During Displacement) which we use to confirm test results should also be reported. Although we accept the results of the test, this does not mean that we agree with all interpretations provided nor that future analysis may not identify some cause for concern. A summary of the results of our review is enclosed.

We are providing the following table in order to assist you in complying with your permit and planning future testing. We could not find an external demonstration of the integrity of the well bore carried out within the last five years for this well. We extended the search to all of the Class III wells and found only a few temperature logs which are now eight or nine years old. The permit for these wells requires a mechanical integrity test pursuant to Title 40 of the Code of Federal Regulations 146.8(a)(2), at intervals no longer than five years. Therefore, they are not in compliance with the area permit or with the UIC regulations. Please review your records. If we are in error, please provide us with copies of the most recent external demonstrations of mechanical integrity for each of the wells operated under area permit MI-133-3G-A002. If some of the Class III wells under this permit have not had external demonstrations within the past five years or ever, arrange for making these demonstrations within the next 60 days and submit the results to our office.

TEST TYPE	WELL NAME	LAST TEST	FREQUENCY	TEST DUE DATE
Internal MIT			within 1 year of last test	
External MIT			within 5 years of last test	

If you have any questions or comments about either the contents of this letter or our interpretation of the tests run, please contact me at (312) 353-6288.

Sincerely yours,

*Jeffrey R. McDonald* 12/22/04

Jeffrey R. McDonald, Geologist  
Underground Injection Control Branch

Enclosure

bcc: H. Gerrish  
P. Saieh  
P. Blakley  
C. Brown/S. Williams; TSA, Inc. c/o Talib Syed  
Well file: **MI-133-3G-A002**

WU-16J:December 22, 2004  
G:\UIC\Class3\1054 MIT ok 2004 hg.wpd

P.S. 12/22/04

# **REVIEW AND CHECK OF WATER-BRINE INTERFACE TEST DATA**

Facility Name <b>Hersey</b>		Operator <b>IMC Potash Hersey, Inc.</b>	
Well Name <b>#1054</b>	Field Name	USEPA Permit Number <b>MI-133-3G-A002</b>	
County <b>Osceola</b>	State <b>Michigan</b>	Test Date <b>07/03/2004</b>	Reviewer <b>Gerrish</b>
		Review Date <b>12/14/2004</b>	

## **Test and Reference Well Information**

Casing Length, ft <b>7839</b>	Casing Volume, g <b>1.6535</b>	Tubing Length, ft <b>6200</b>	Starting SG <b>1.218</b>	Vol. to Inject, gals. <b>7210</b>	Reference Well No. <b>1051 tubing</b>
Casing OD, in <b>7.000</b>	Prop. Interface D <b>7458</b>	Tubing OD, in <b>4.5</b>	Test Liquid <b>Water</b>	Calc. Pressure, psi <b>491</b>	Specific Gravity <b>1.218</b>
Casing weight, lb <b>23</b>	Flushed Casing? <b>Yes</b>	Tubing Displ., gal/ft <b>0.8261</b>	Specific Gravity <b>1.066</b>	Calc. Interface Depth, ft <b>7451</b>	Measured Pressure <b>562</b>

## **History of Brine Displacement**

Maximum Injection Rate to Achieve Displacement of less than 20 feet per minute, gals/min -							<b>16.5</b>
	DATE	TIME hr:min	MEASURED PRESSURES, psi TEST WELL	REFERENCE	DIFFERENCE psi	CHANGE psi	APPROX RATE ft/min
Start	06/29/2004	12:00	572.771	508.612	64.159	--	--

## **Pressure Change During Displacement, psi**

Desired Difference in Pressure Measurements	<b>490.969</b>	Implies interface is at, ft	<b>7458</b>
Measured Difference in Pressure Measurements	<b>0</b>	Implies interface is at, ft	
Is within 50 feet of the total casing length?			

## **Pressure Measurements During Temperature Stabilization**

	DATE	TIME	PRESSURE				
			TEST WELL	REFERENCE			
Start		00:00	0.000	0			
Measured Difference after Temperature Equilibration					<b>490.49</b>		<b>7451</b>
	DATE	TIME hr	MEASURED PRESSURES		DIFFERENCE psi	CHANGE psi	CHANGE psi/hr
			TEST WELL	REFERENCE			
Start	07/02/2004	16:00	1052.490	562.000	490.49	--	--
2 hours	07/02/2004	18:00	1052.740	562.334	490.406	-0.084	-0.042
4 hours	07/02/2004	20:00	1052.600	562.022	490.578	0.172	0.086
6 hours	07/02/2004	22:00	1052.280	562.037	490.243	-0.335	-0.167
8 hours	07/03/2004	00:00	1052.780	562.186	490.594	0.351	-0.016
	<b>TOTAL</b>	<b>08:00</b>			<b>TOTAL</b>	<b>0.104</b>	<b>0.013</b>

## **TEST OUTCOME**

Pressure Change, psi/hour	<b>0.013</b>
Movement of Interface, ft. (negative is downward)	<b>-1.580</b>
Rate of Leakage, gals/hr	<b>-0.327</b>
If pressure change is less than 0.05 psi/hr, PASS	<b>PASS</b>

### **Comments**

The information submitted was incomplete. All of the time and pressure data gathered should be submitted. The form of the submission made finding the data to fill in this worksheet easy, but without all of the data, we feel less certain that the steps described were carried out. In the future, the pressures measured during fill up and temperature stabilization and the times of measurement should be included.





## IMC Potash Hersey Inc.

1395 135th Avenue

Hersey, Michigan 49639

Telephone: (231) 832-3755

Fax: (231) 832-3349

July 7, 2004

Jeff McDonald  
Underground Injection Control Branch  
United States Environmental Protection Agency  
77 E. Jackson Blvd, WU-16J  
Chicago, IL 60604-3590

RECEIVED  
JUL 17 2004  
UIC BRANCH  
EPA REGION 5

RE: MI-133-3G-A002  
IMC Potash Hersey 1054 MIT

IME Potash Hersey has performed a successful Mechanical Integrity Test on our Class III solution mining well 1054 using the "Water-Brine Interface" method. Enclosed are the results of the test for both the test and reference wells.

We respectfully request acknowledgement of EPA acceptance of these test results.

If I can assist you with any additional information, please contact me at 231-832-1216.

Sincerely,

Robert Schweitzer  
Production Superintendent  
ICM Potash Hersey

Cc: Raymond Vugrinovich, Michigan Department of Environmental Quality  
Cc: Robb Aultman, General Manager Hersey



## IMC Potash Hersey

### WATER-BRINE INTERFACE MECHANICAL INTEGRITY TEST WELL INFORMATION

Test Well No:	1054	
Location, Section, Township, Range	Cluster 1 Sec26 T17N R09W	
County, State	Osceola, Michigan	
Casing Size	7	inches
Depth of Intact Casing	7839	measurement
Tubing Size	4 ½	inches
Tubing Depth	6200	measurement
Packer Cup Mandrel Depth (Top)	none	measurement
Liner Size	none	inches
Liner Interval	none	measurement
Depth of A-1 Salt (Top)	7807	measurement
Depth of A-1 Salt (Top)	7487	TVD
Depth of Borgen Bed (Top)	7836	measurement
Depth of Borgen Bed (Top)	7508	TVD
Logged Depth of Cavity (Top)	7836	measurement
Capacity of Casing	1.6534	gal/ft
Capacity of 4 ½ x 7 Annulus	.8272	gal/ft
Capacity of Liner	.6528	gal/ft
Capacity of Well from Surface to 50' above Borgen	11225	gal
Used for Injection or Return	Injection	
Normal Operating Pressure	1200	psi
Reference Well No:	1051	
Capacity of Reference Well from surface to cavity	11360	gal
No. of Wells in Cavity	2	

Complied by:	Bill Hicks
Date:	6-21-04



WATER-BRINE INTERFACE MECHANICAL INTEGRITY TEST  
PRESSURE INSTRUMENTATION INFORMATION

	TEST WELL NO. 1054	REFERENCE WELL NO. 1051
Manufacturer	Paroscientific Inc.	Paroscientific Inc.
Type	Digiquartz Portable Standard	Digiquartz Portable Standard
Port No.	1107-033-0	1107-033-0
Model No.	760 – 2K	760 – 2K
Serial No.	47973	54710
Accuracy %FS	0.01%	0.01%
Precision, psi	0.001 psi	0.001 psi

Complied by: Bill Hicks

Date: 6-21-04

WATER-BRINE INTERFACE MECHANICAL INTEGRITY TEST

# PROCEDURE REPORT, PAGE ONE

See Standard Operating Procedure (Ieb 121, dated 9/10/93)

1. Inject water or under saturated brine in test well to remove crystallized salt and pressurize the cavity.

Date	6-29-04
Time	10:15 hrs
Name	Dewayne Hamilton
Quantity Injected	12000 gal.
Saturation	0 %

2. Return brine from the test well to establish a constant specific gravity.

Date	6-29-04
Time	12:30
Name	Dewayne Hamilton
Quantity Returned	12000
Specific Gravity at end of Return	1.180
Shut in Pressures:	
1054 Test Well	572.771
1051 Reference Well	508.612

3. Return brine from the reference well and establish a constant specific gravity.

Date	6-29-04
Time	1800
Name	Dewayne Hamilton
Quantity Returned	10000 Gal.
Specific Gravity at end of Return	1.218
Shut in Pressures:	
1054 Test Well	534.040
1051 Reference Well	421.647

4. Inject water or oil in test well to establish interface.

## a) Calculate injection rates:

Depth	0 to 6200	6200-7508	to	To
Casing or Annulus size	7" 23# X 4 1/2"	7" 23#		
Capacity, gal/ft	.8272	1.6534		
X Max. Velocity	20 ft/min	20 ft/min	20 ft/min	20 ft/min
= Max. Inj. Rate	16.5 GPM	33.1 GPM	GPM	GPM
Capacity This Interval	5128 gal	2162 gal		
Capacity From Surface to Bottom of Interval	5128 gal	7291 Gal		

## b) Calculate Target Differential Pressure:

$$\begin{aligned}
 \text{Differential Pressure} &= (\text{TVD}-50) \times (\text{S.G.1} - \text{S.G.2}) \\
 &= (7508 - 50) (1.218 - 1.066) \times .4331 \\
 &= 490.96
 \end{aligned}$$

WATER-BRINE INTERFACE MECHANICAL INTEGRITY TEST

## 4b. Contd.

[illegible]

GPM 16.5  
→ displacement  
↔ 20 ppm  
disturbance only  
no measurement

$$\text{Differential Pressure} \times \frac{1}{(\text{S.G.1} - \text{S.G.2}) \times K} = \text{ft. TVD}$$

$$490.988 \times \frac{1}{(1.218 - 1.066 \times .4331)} = 7458\text{TVD}$$

5. Leak Check  
At End of Pumping:

Time: 2000 Hrs Date: 6-30-04 By: Darryl Lalonde-Bill Hicks  
 Pressures: Test Well: 1054 Reference Well: 1051

Leak Checks:

	Yes	No	Repaired
Wellhead Flanges		X	
Tubing Connections		X	
Annulus Connections	X		Yes
Dilution Connections		X	
Blind Flanges		X	
Bleed and Gauge Taps		X	
Other			

Comments:

Had to repair wellhead leak on 1051 annulus-1/2 inch bushing was leaking.

After Two Hours

Time: 0100 Date: 7-1-04 By: Darryl Lalonde  
 Pressures: 1054 Test Well: 1039.71 1051 Reference Well: 549.616

Wait for 36 hours.	Time Right Now: 1600	MIT Start Time: 1600
--------------------	----------------------	----------------------

7-10. Mechanical Integrity Test

Date: By: Bill Hicks

Date	Time	1054 Test Well	1051 Reference Well	Differential Pressure	Change in Diff. Press. Since Start
7-02-04	1600	1052.49	562.000	490.490	
7-02-04	1800	1052.74	562.334	490.406	.084
7-02-04	2000	1052.60	562.022	490.578	-.088
7-02-04	2200	1052.28	562.037	490.243	.247
7-03-04	0001	1052.78	562.186	490.594	-.104

11. Calculate Net Pressure Change (NPC)

$$\text{NPC} = \frac{\text{Diff. Press. (Start)} - \text{Diff. Press. (End)}}{\text{Hours}}$$

$$\text{NPC} = (490.490 - 490.594) / 8 = -0.013 \text{ psi/hr}$$

NPC = WATER-BRINE INTERFACE MECHANICAL INTEGRITY TEST  
 PROCEDURE REPORT, PAGE FOUR  
 See Standard Operating Procedure (Ieb 121, dated 9/10/93)

12. Certification

This test was performed as per the procedure approved by the Environmental Protection Agency published in the Federal Register Vol 57, No. 7/Friday, January 10, 1992, Page 1109-1112. I certify that IMC Potash Well No. 1054 has

☒ passed

☐ failed

to demonstrate a net pressure change of less than 0.05 psi/hr over the eight hour test period.

Test conducted by:

IMC Potash Hersey.

Name: Bill Hicks

Title: Minefield Supervisor

Date: 7-03-04

Signature: *William Hicks*

Other individuals involved in test procedure:

Name	Organization	Involvement
Dewayne Hamilton	IMC	Operations
Chad Nicklas	IMC	Operations
Darryl Lalonde	IMC	Operations



Mosaic Potash Hersey LLC  
1395 135th Ave.  
Hersey, MI 49639  
www.mosaicco.com

Tel 231-832-3755

February 15, 2007

Lisa Perenchio, Chief  
Underground Injection Control Branch  
United States Environmental Protection Agency  
77 W. Jackson Blvd, WU-16J  
Chicago, IL 60604-3590

RECEIVED

FEB 20 2007

UIC BRANCH  
EPA REGION 5

RE: Permit MI-133-3G-A002  
Well 1011 Plugging and Abandonment

Mosaic Potash Hersey intends to plug and abandon Class III solution mining Well Number 1011. This letter serves to notify the EPA of our intention.

The USEPA REGION 5 GUIDANCE #4 (revised December, 1994) will be followed to ensure proper plugging and abandonment of the well. GUIDANCE #4 along with the approved P & A plan contained in Part III(B) of Permit MI-133-3G-A002 will be used to establish the specific procedures.

Part (2) of mechanical integrity will be demonstrated with a temperature log prior to plugging the well. The temperature log will be used to demonstrate that there is no fluid movement behind the well casing.

Please inform me as soon as possible if this plan is acceptable or if other requirements need to be addressed. Additionally, let me know if the EPA wishes to witness any of the plugging operations so that I can coordinate the scheduling.

If I can assist you with any additional information, please contact me at 231-832-1216.

Sincerely,

Robert Schweitzer  
Production Superintendent  
Mosaic Potash Hersey

Cc: Raymond Vugrinovich, Michigan Department of Environmental Quality





Mosaic Potash Hersey LLC  
1395 135th Ave. E.  
Hersey, MI 49639  
www.mosaicco.com

Tel 231-832-3755

February 15, 2007

Lisa Perenchio, Chief  
Underground Injection Control Branch  
United States Environmental Protection Agency  
77 W. Jackson Blvd, WU-16J  
Chicago, IL 60604-3590

RECEIVED

FEB 20 2007

UIC BRANCH  
EPA REGION 5

RE: Permit MI-133-3G-A002  
Well 1012 Plugging and Abandonment

Mosaic Potash Hersey intends to plug and abandon Class III solution mining Well Number 1012. This letter serves to notify the EPA of our intention.

The USEPA REGION 5 GUIDANCE #4 (revised December, 1994) will be followed to ensure proper plugging and abandonment of the well. GUIDANCE #4 along with the approved P & A plan contained in Part III(B) of Permit MI-133-3G-A002 will be used to establish the specific procedures.

Part (2) of mechanical integrity will be demonstrated with a temperature log prior to plugging the well. The temperature log will be used to demonstrate that there is no fluid movement behind the well casing.

Please inform me as soon as possible if this plan is acceptable or if other requirements need to be addressed. Additionally, let me know if the EPA wishes to witness any of the plugging operations so that I can coordinate the scheduling.

If I can assist you with any additional information, please contact me at 231-832-1216.

Sincerely,

Robert Schweitzer  
Production Superintendent  
Mosaic Potash Hersey

Cc: Raymond Vugrinovich, Michigan Department of Environmental Quality



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1395 135th Avenue  
Hersey, MI 49639  
www.mosaicco.com

Tel 231-832-3755

February 15, 2007

RECEIVED

Lisa Perenchio, Chief  
Underground Injection Control Branch  
United States Environmental Protection Agency  
77 W. Jackson Blvd, WU-16J  
Chicago, IL 60604-3590

FEB 20 2007

UIC BRANCH  
EPA REGION 5

RE: Permit MI-133-3G-A002  
Well 1014 Plugging and Abandonment

Mosaic Potash Hersey intends to plug and abandon Class III solution mining Well Number 1014. This letter serves to notify the EPA of our intention.

The USEPA REGION 5 GUIDANCE #4 (revised December, 1994) will be followed to ensure proper plugging and abandonment of the well. GUIDANCE #4 along with the approved P & A plan contained in Part III(B) of Permit MI-133-3G-A002 will be used to establish the specific procedures.

Part (2) of mechanical integrity will be demonstrated with a temperature log prior to plugging the well. The temperature log will be used to demonstrate that there is no fluid movement behind the well casing.

Please inform me as soon as possible if this plan is acceptable or if other requirements need to be addressed. Additionally, let me know if the EPA wishes to witness any of the plugging operations so that I can coordinate the scheduling.

If I can assist you with any additional information, please contact me at 231-832-1216.

Sincerely,

Robert Schweitzer  
Production Superintendent  
Mosaic Potash Hersey

Cc: Raymond Vugrinovich, Michigan Department of Environmental Quality



Mosaic Potash Hersey LLC  
1395 135th Ave.  
Hersey, MI 49639  
www.mosaicco.com

Tel 231-832-3755

February 15, 2007

RECEIVED

Lisa Perenchio, Chief  
Underground Injection Control Branch  
United States Environmental Protection Agency  
77 W. Jackson Blvd, WU-16J  
Chicago, IL 60604-3590

FEB 20 2007

UIC BRANCH  
EPA REGION 5

RE: Permit MI-133-3G-A002  
Well 1042 Plugging and Abandonment

Mosaic Potash Hersey intends to plug and abandon Class III solution mining Well Number 1042. This letter serves to notify the EPA of our intention.

The USEPA REGION 5 GUIDANCE #4 (revised December, 1994) will be followed to ensure proper plugging and abandonment of the well. GUIDANCE #4 along with the approved P & A plan contained in Part III(B) of Permit MI-133-3G-A002 will be used to establish the specific procedures.

Part (2) of mechanical integrity will be demonstrated with a temperature log prior to plugging the well. The temperature log will be used to demonstrate that there is no fluid movement behind the well casing.

Please inform me as soon as possible if this plan is acceptable or if other requirements need to be addressed. Additionally, let me know if the EPA wishes to witness any of the plugging operations so that I can coordinate the scheduling.

If I can assist you with any additional information, please contact me at 231-832-1216.

Sincerely,

Robert Schweitzer  
Production Superintendent  
Mosaic Potash Hersey

Cc: Raymond Vugrinovich, Michigan Department of Environmental Quality

**HALLIBURTON SERVICES**

P.O. Box 374

Mt. Pleasant, MI 48804-0374

Office Number: (517) 772-6070 or 773-1080

Fax Number: (517) 772-9347

DATE: 11-22-91

DELIVER TO:

Mr. Bob SchweitzerKalium Chemicals(616) 832-3349PAGES TO FOLLOW: 5 ea. (Not Including Cover Sheet)

FROM:

David Andrews

COMMENTS:

Here is the Plug to Abandon Ticket for  
the St. Hersey 2-35 well. It was plugged  
from 5486' to surfaceThank You,David Andrews

If problems are encountered receiving any of the  
above listed documents, please call (517) 772-6070.





We certify that the Fair Labor Standards Act of 1938, or amendment, has been complied with in the production of goods and/or with respect to services furnished under this contract.



WELL DATA  
FIELD Wabash COUNTY OSCEOLA STATE IL  
FORMATION NAME Wabash TYPE Shale  
FORMATION THICKNESS FROM 0 TO 5486  
INITIAL PRODT OIL SPR. WATER SPR. GAS NOPE  
PRESENT PRODT OIL SPR. WATER SPR. GAS NOPE  
COMPLETION DATE 8/29 MUD TYPE WATER MUD WT. 11.0  
PACER TYPE SET AT  
BOTTOM HOLE TEMP. 5486 PRESSURE 5486  
HRS. DAYS 5486 TOTAL DEPTH 5486

TOOLS AND ACCESSORIES

TYPE AND SIZE	QTY.	MAKE
FLAT BALL		
FLAT SHOE		
GUIDE SHOE		
CENTRALIZER		
BOTTOM PLUG		
TOP PLUG		
HEAD		
PACKER		
OTHER <u>Swivel 270°</u>		<u>Howard</u>

MATERIALS

TRAILER FLUID Cement DENSITY 12.4 LBS/GAL  
WELL FLUID Water DENSITY 8.33 LBS/GAL  
PROP. TYPE WATER CONC. 11.0  
PROP. TYPE WATER CONC. 11.0  
ACID TYPE WATER CONC. 11.0  
ACID TYPE WATER CONC. 11.0  
ACID TYPE WATER CONC. 11.0  
SURFACTANT TYPE WATER CONC. 11.0  
HE AGENT TYPE WATER CONC. 11.0  
FLUID LOSS AGENT TYPE WATER CONC. 11.0  
GELLING AGENT TYPE WATER CONC. 11.0  
FRIG. RES. AGENT TYPE WATER CONC. 11.0  
HEAVY TYPE WATER CONC. 11.0  
BLOCKING AGENT TYPE WATER CONC. 11.0  
PERFOR. BALL TYPE WATER CONC. 11.0  
OTHER WATER CONC. 11.0

JOB DATA

DATE	TIME	DATE	TIME	DATE	TIME	DATE	TIME
8/29	0700	8/29	0700	8/29	0955	8/29	1800

PERSONNEL AND SERVICE UNITS

NAME	UNIT NO. & TYPE	LOCATION
<u>Bob Baker</u>	<u>Operator</u>	<u>MTA</u>
<u>Bob Hunt</u>	<u>9932</u>	<u>MTA</u>
<u>Bob Smith</u>	<u>41-C</u>	<u>MTA</u>
<u>Bob Smith</u>	<u>41-C</u>	<u>MTA</u>

DEPARTMENT Cement  
DESCRIPTION OF JOB Cement PTD  
JOB DONE THROUGH ☒ CASING ☐ ANNULAR ☐ YES (ANN) ☐  
CUSTOMER REPRESENTATIVE X C. M. C. D. D.  
HANDS ON OPERATOR Bob Baker COMES REQUESTED NO

CEMENT DATA

STAGE	NUMBER OF BAGS	TYPE	API CLASS	BRAND	BULK BAGGED	ADDITIONS	YIELD CU.FT./SK.	MIXED LBS./GAL.
1	950	LRS	A	Portland	B	<u>Monroe LRS</u>	127	12.8
2	75	com	A	Portland	B	<u>Cement com</u>	112	11.6

SUMMARY

PRESSURES IN PSI  
CIRCULATING 11.0 DISPLACEMENT 11.0  
BREAKDOWN 11.0 MAXIMUM 11.0  
AVERAGE 11.0 FRACTURE GRADIENT 11.0  
SHUT-IN INFLUX 11.0 HYDRAULIC HORSEPOWER 11.0  
ORDERED 11.0 AVAILABLE 11.0 USED 11.0  
AVERAGE RATES IN BPM 11.0  
TREATING 11.0 DISPL. 11.0 OVERALL 11.0  
CEMENT LEFT IN PIPE 11.0  
FRTY Balance Plug

VOLUMES  
PRESSURE: 11.0 GAL. TYPE 11.0  
LOAD & SHOCK: 11.0 GAL. PART: 11.0 GAL.  
TREATMENT: 11.0 GAL. DISPL: 11.0 GAL.  
CEMENT SLURRY: 11.0 GAL.  
TOTAL VOLUME: 11.0 GAL.  
REMARKS 5486 Job Log

CHART NO.	TIME	RATE (GPM)	VOLUME (GAL)	PUMPS		PRESSURE (PSI)		DESCRIPTION OF OPERATION AND MATERIALS
				T	C	TUBING	SAFING	
	0900							TRIPPS all location
	0910							Hold safety meeting back up today line
	0955		190	1		450		Circulate well w/ Fresh water
								1st plug - 5486
	1100	5 bpm	10	1		200		Pump Fresh water fresh head
	1105	5 bpm	54.7	1		200		Mix cement (Hawesite 12.4) 156.8
	1115			1		100		Pump Fresh water Displacement
	1118	2 bpm	26	1		100		Displacement in - plug balanced 5486
								2nd plug - 4589
	1255	5	10	1		200		Pump Fresh water ahead
	1200	5	54.7	1		200		Mix cement (Hawesite 12.4) 156.8
	1210			1		100		Pump Fresh water Displacement
	1216	7	21	1		100		Displacement in - plug balanced 2nd
								3rd plug - 3088
	1315	5	10	1		200		Pump Fresh water ahead
	1331	5	54.7	1		200		Mix cement (Hawesite 12.4) 156.8
	1343			1		100		Pump Fresh water Displacement
	1349	6	15.5	1		100		Displacement in - plug balanced 3rd
								4th plug - 2289
	1350	5	10	1		200		Pump Fresh water ahead
	1402	5	54.7	1		200		Mix cement (Hawesite 12.4) 156.8
	1412			1		100		Pump Fresh water Displacement
	1416	8	10	1		100		Displacement in - plug balanced 4th
								5th plug - 1890
	1445	5	10	1		200		Pump Fresh water ahead
	1504	5	54.7	1		200		Mix cement (Hawesite 12.4) 156.8
	1502			1		100		Pump Fresh water Displacement
	1504	6	5	1		100		Displacement in - plug balanced 5th
								6th plug - 991
	1530	5	10	1		200		Pump Fresh water ahead
	1547	5	45.5	1		200		Mix cement (Hawesite 12.4) 130.85
	1550			1		100		Pump Fresh water Displacement
	1555	6	1	1		100		Displacement in - plug balanced 6th
	1605	5	16	1		200		Mix cement to surface - 255K cone
	1621	5	1	1		100		1st displacement 1245 bbl
								Circulate fresh cement to surface



STATE OF MICHIGAN  
DEPARTMENT OF NATURAL RESOURCES  
**LOG OF OIL, GAS, DISPOSAL OR STORAGE WELL (ACT 61)**  
Submit in DUPLICATE Within 30 Days after Well Completion

PERMIT NUMBER <b>36033</b>
DEEPENING PERMIT NUMBER

NAME(S) & ADDRESS OF OWNER(S) SHOWN ON PERMIT PPG Oil & Gas Co., Inc. 2258 Enterprise Drive Mt. Pleasant, MI 48858				NAME & ADDRESS OF DRILLING CONTRACTOR(S) T. D. Provins Drilling 2113 Enterprise Drive Mt. Pleasant, MI 48858				
LEASE NAME(S) & WELL NUMBER SHOWN ON PERMIT <b>Grein #2-36</b>						DIRECTIONALLY DRILLED YES <input type="checkbox"/> NO <input checked="" type="checkbox"/>		
SURFACE LOCATION <b>SE NW NW</b>		SECTION <b>36</b>		TOWNSHIP <b>17N</b>		RANGE <b>9W</b>		
TOWNSHIP NAME <b>Hersey</b>						COUNTY NAME <b>Osceola</b>		
FOOTAGES (North/South) <b>460'</b> Ft. from <b>North</b> Line and <b>835'</b> Ft. from <b>West</b> Line of quarter section						TOWNSHIP NAME		
SUBSURFACE LOCATION						COUNTY NAME		
FOOTAGES (North/South) _____ Ft. from _____ Line and _____ Ft. from _____ Line of quarter section						TOWNSHIP NAME		
FOOTAGES (East/West) _____ Ft. from _____ Line and _____ Ft. from _____ Line of quarter section						COUNTY NAME		
DATE	DRILLING BEGUN <b>7-18-83</b>		TOTAL DEPTH OF WELL Driller <b>8119</b> Log <b>8118</b>		TYPE WELL <b>Gas</b>		ELEVATIONS	
	DRILLING COMPLETED <b>8-12-83</b>		FORMATION AT T.D. <b>Cabot Head</b>		FT. DRLD. - ROTARY TOOLS From <b>0</b> To <b>8119</b>		K.B. <b>1127</b>	R.F. <b>1126</b>
	WELL COMPLETED <b>11-22-83</b>		PRODUCING FORMATION(S)		FT. DRLD. - CABLE TOOLS From _____ To _____		R.T.	Grd. <b>1110</b>

**CASING, CASING LINERS AND CEMENTING**

**PERFORATIONS**

SIZE	WHERE SET	CEMENT	Ft. Pulled	DATE	NUMBER HOLES	INTERVAL PERFORATED	DPEN	
20"	104'	DP					YES	NO
11 3/4"	904'	350 poz/200 C1	A	11-19-83	26x	8030-46 1x/ft	XX	
8 5/8"	5418' Sch	1210 sx 1t-300	sx C1 A			8049-59 1x/ft	XX	
5 1/2"	8118	425 sx poz-300	1t					
		160 C1 A						

**GROSS PAY INTERVALS**

**ALL OTHER OIL AND GAS SHOWS OBSERVED OR LOGGED**

FORMATION	OIL OR GAS	FROM	TO	FORMATION	OIL OR GAS	DEPTH	WHERE OBSERVED (X)					
Burnt Bluff	Gas	8130	8170	Sunbury	Gas	2600	Sam- ples	Odor	Pits	Mud Line	Gas Log	Full Up
				Antrim	Gas	3100					X	
				Sour Zone	Gas	4600					X	

**STIMULATION BY ACID OR FRACTURING**

**WATER FILL UP (F.U.) OR LOST CIRCULATION (L.C.) (X)**

DATE	Interval Treated	Materials and amount used	FORMATION	F.U.	L.C.	DEPTH	AMOUNT
11-20-83	8030-59	500 gal. 28% HCl	None				

**MECHANICAL LOGS, LIST EACH TYPE RUN**

**DEPTH CORRECTION DEVIATION SURVEY PLUGGED BACK**

Brand	(X)	LOG TYPES	LOGGED INTERVALS	DEPTH	CORRECTN	RUN AT	DEGREES	YES	NO	DEPTH
Schlumberger	X	LDT-CNL-GR	200-8118			3050	3/4°			
Birdwell		Sonic	200-8118			4600	1°			
		Dual-Micro	2900-8118			5800	1/4°			
						6600	1°			

**PRODUCTION TEST DATA**

OIL - Bbls/day	GRAVITY - °API	COND. Bbls/day	GAS - MCF/day	WATER - Bbls/day	H <sub>2</sub> S - Grains/100 cu. ft.	B.H.P. AND DEPTH
			1,400			

I AM RESPONSIBLE FOR THIS REPORT. THE INFORMATION IS COMPLETE AND CORRECT.

DATE <b>9/13/83</b>	NAME AND TITLE (PRINT) <b>William E. Booker</b>	B-59	SIGNATURE <i>William E. Booker</i>
------------------------	--	------	---------------------------------------

NOTICE REPORT COMPLETE SAMPLE AND FORMATION RECORD AND DRILL STEM TEST INFORMATION ON REVERSE SIDE

R - 7210  
Rev. 3/77

STATE OF MICHIGAN  
DEPT. OF NATURAL RESOURCES  
**LOG OF OIL, GAS, DISPOSAL OR STORAGE WELL (ACT 61)**  
Submit in DUPLICATE Within 30 Days after Well Completion

PERMIT NUMBER  
**36925**  
DEEPENING PERMIT NUMBER

NAME(S) & ADDRESS OF OWNER(S) SHOWN ON PERMIT PPG Oil & Gas Co., Inc. 2258 Enterprise Drive Mt. Pleasant, MI 48858				NAME & ADDRESS OF DRILLING CONTRACTOR(S) T. D. Provins 2113 Enterprise Drive Mt. Pleasant, MI 48858			
LEASE NAME(S) & WELL NUMBER SHOWN ON PERMIT Baldino #1-36						DIRECTIONALLY DRILLED - YES <input type="checkbox"/> NO <input checked="" type="checkbox"/>	
SURFACE LOCATION NE NW SW		SECTION 36	TOWNSHIP 17N	RANGE 9W	TOWNSHIP NAME Hersey		
FOOTAGES (North/South) 460 Ft. from North		Line and 840		(East/West) Ft. from West		Line of quarter section	COUNTY NAME Osceola
SUBSURFACE LOCATION		SECTION	TOWNSHIP	RANGE	TOWNSHIP NAME		
FOOTAGES (North/South)		Line and		(East/West) Ft. from		Line of quarter section	COUNTY NAME
D A T E	DRILLING BEGUN 8-17-83		TOTAL DEPTH OF WELL Driller 8200 Log 8190		TYPE WELL Gas Well		ELEVATIONS
	DRILLING COMPLETED 9-10-83		FORMATION AT T.D. Cabot Head		FT. DRLD. - ROTARY TOOLS From 0 To 8190		
	WELL COMPLETED 11-17-83		PRODUCING FORMATION(S) Burnt Bluff		FT. DRLD. - CABLE TOOLS From To		
					K.B. 1183.2	R.F. 1181.9	
					R.T.	Grd. 1166.6	

CASING, CASING LINERS AND CEMENTING				PERFORATIONS			
SIZE	WHERE SET	CEMENT	Ft. Pulled	DATE	NUMBER HOLES	INTERVAL PERFORATED	OPEN YES NO
24"	100	D.P.					
11 3/4"	954 Sch	550 sx		11-16-83	1x/ft	8086-8089	X
8 5/8"	5476 Sch	1470 sx			1x/ft	8094-8102	X
5 1/2"	8190	950 sx			1x/ft	8108-8112	X

GROSS PAY INTERVALS				ALL OTHER OIL AND GAS SHOWS OBSERVED OR LOGGED							
FORMATION	OIL OR GAS	FROM	TO	FORMATION	OIL OR GAS	DEPTH	WHERE OBSERVED (X)				
Burnt Bluff	Gas	8090	8126	Traverse	Gas	3620	Sam- ples	Odor	Pits	Mud Line	Gas Log
				Reed City Dol	Gas	4065					Fit Up
				Richfield	Gas	4810					

STIMULATION BY ACID OR FRACTURING			WATER FILL UP (F.U.) OR LOST CIRCULATION (L.C.) (X)				
DATE	Interval Treated	Materials and amount used	FORMATION	F.U.	L.C.	DEPTH	AMOUNT
11-17-83	8086-8112	2000 gal. 20%	None				

MECHANICAL LOGS, LIST EACH TYPE RUN				DEPTH CORRECTION		DEVIATION SURVEY		PLUGGED BACK		
Brand	(X)	LOG TYPES	LOGGED INTERVALS	DEPTH	CORRECT'N	RUN AT	DEGREES	YES	NO	DEPTH
Schlumberger	X	LDT CNL GR	200-8190			2750	1/2°			
Birdwell		Sonic	200-8190			4300	1°			
O. Inc.		DLL-MLL	2500-8190			6600	1°			
						7900	1/2°			

PRODUCTION TEST DATA						
OIL - Bbls/day	GRAVITY - °API	COND. Bbls/day	GAS - MCF/day	WATER - Bbls/day	H <sub>2</sub> S - Grains/100 cu. ft.	B.H.P. AND DEPTH
			1,450			

I AM RESPONSIBLE FOR THIS REPORT. THE INFORMATION IS COMPLETE AND CORRECT.

DATE 11-9-83	NAME AND TITLE (PRINT) William E. Booker, Geologist	B-62 SIGNATURE <i>William E. Booker</i>
-----------------	--	--

NOTICE REPORT COMPLETE SAMPLE AND FORMATION RECORD AND DRILL STEM TEST INFORMATION ON REVERSE SIDE

NUMBER 38748  
DEEPENING PERMIT NUMBER

## PERFORATIONS

ALL OTHER OIL AND GAS SHOWS OBSERVED OR LOGGED

WATER FILL UP (F.U.) OR LOST CIRCULATION (L.C.) (X)

DEPTH CORRECTION    DEVIATION SURVEY    PLUGGED BACK

### PRODUCTION TEST DATA

I AM RESPONSIBLE FOR THIS REPORT. THE INFORMATION IS COMPLETE AND CORRECT.

NOTICE REPORT COMPLETE SAMPLE AND FORMATION RECORD AND DRILL STEM TEST INFORMATION ON REVERSE SIDE

R. 7210  
Rev. 3/77



DEPARTMENT OF NATURAL RESOURCES  
GEOLOGICAL SURVEY DIVISION  
LANSING, MI 48909  
BOX 30028 - LANSING, MI 48909  
DEPARTMENT OF NATURAL RESOURCES  
GEOLOGICAL SURVEY DIVISION  
LANSING, MI 48909  
BOX 30028 - LANSING, MI 48909

2

STATE OF MICHIGAN  
DEPARTMENT OF NATURAL RESOURCES  
GEOLOGICAL SURVEY DIVISION

MAY 13 1975

WELL PLUGGING RECORD

(Submit in TRIPLICATE Within 30 Days After Plugging is Completed)

PERMIT NUMBER  
30341  
FIELD NAME  
Hersey Gas Field

COMPLETE NAME(S) AND ADDRESS OF WELL OWNER  
J O Mutch, Sterling, Mich  
COMPLETE LEASE OR FARM NAME(S)  
Douglas Miller and Hauldah Thiel  
WELL LOCATION  
CSW X - X - X SEC. 25 T. 17N R. 9W  
TOWNSHIP  
Hersey  
COUNTY  
Oscoda  
TYPE OF WELL (Oil, Gas, Dry Hole, etc.)  
Dry hole  
TOTAL DEPTH  
1561  
FORMATION  
Stray  
DATE PLUGGING STARTED  
AUG 7, 1975  
DATE PLUGGING COMPLETED  
AUG 8, 1975  
DEPT. REPRESENTATIVE(S) WHO ISSUED PERMIT OR WITNESSED PLUGGING  
John A Snider

CASING RECORD			
SIZE CASING	DEPTH SET	AMOUNT RECOVERED	SHOT OR RIPPED
8 5/8	621	none	
4 1/2	1520	1100	ripped

BRIDGES OR PLUGS		
TYPE (Brush, Stone, Cement, Mechanical, etc.)	DEPTH PLACED	SACKS OF CEMENT AND ADDITIVES

Were tools, tubing, casing, etc., lost or left in the hole before or during plugging? ☒ YES ☐ NO If yes, give details: all of 8 5/8 casing and 420 of 4 1/2 casing left in hole

Did a Service Company pump mud, spot cement, or set bridge plugs? ☒ YES ☐ NO If yes, give name and address: Danys Acid Service, Grand Rapids

Was the well plugged by a Company or Contractor other than Owner or Operator? ☒ YES ☐ NO If yes, give name and address: Danys Acid Service, Grand Rapids

Representatives of Owner, Operator, Company, or Contractor who witnessed plugging: Tom Sibley Larry Sibley Dutch Jacobs Phil Roberts

DESCRIBE IN DETAIL HOW WELL WAS PLUGGED Heavy pit and pumped in hole and 4 1/2 ripped at 1100' and pulled to 625, keeping hole full of mud, 15 lbs of cement were spotted at this point and rest of 4 1/2 casing pulled out and cement plug was put in 8" casing and steel plate welded over this.

(USE REVERSE SIDE IF NEEDED)

CERTIFICATION  
"I state that I am authorized by said Owner or Operator to make this report; and that this report was prepared under my supervision and direction, and that the facts stated herein are true, correct and complete to the best of my knowledge."

NAME AND TITLE (Typed or Printed)  
Lewis C Sibley Owner  
SIGNATURE  
Lewis C Sibley  
DATE (Month, Day, Year)  
Sept 11, 1975  
COMPANY NAME AND ADDRESS  
Sibley Drilling Co  
Salkoville, Michigan

TC 16 02

TO BE FILED WITH SUPERVISOR OF WELLS WITHIN 30 DAYS  
AFTER COMPLETION OF WELL TEST BY A & A 1988  
AND ACT 800 P & 1987.

(Submit in Duplicate)

B-15

ALLIANCE SUPPLY DIVISION - LANSING, MI 48909  
 \*\*\* DAN BELLERICH, MANAGER, DIVISION - BOX 30028 - LANSING, MI 48909  
 \*\*\* FRED COOK, GENERAL SUPERV DIVISION - BOX 30028 - LANSING, MI 48909

總編

### WELL KNOWN RECORD

SECRET

1994年12月25日

227

**FILED**

## Barney Can Fight

CRACKING RECORD			
SIN CRACK	DEPTH IN.	ASBESTOS RECOVERED	SPLOD ON SURF
# 5/8"	648	none	no
7"	694	"	"
4 1/2"	1501	180 ft.	ripped

☐ YES ☒ NO

**## yes, give details**

☒ YES ☐ NO

if yes, give name and address:

Halliburton

☐ YES ☐ NO

If yes, give name and address.

Sibley Drilling Co

who witness and HARRY L. MATCH  
256 Lakeshire Rd., Battle Creek, Mich.

DESCRIBE IN DETAIL HOW WELL WAS FLOODED We tagged bottom with tubing and pumped 10 bbls. of and followed with 40 sacks of cement. We pulled tubing out of hole and ripped off 54" casing at 180 ft. We ran tubing back to 750 ft. and spotted 50 sacks of cement and pulled tubing out of hole. We set a branch bridge at 10 ft. and filled to 4 ft. with cement. We cut 3 5/8" pipe off and welded steel plate on top at 3 ft. below grd. level. We encountered no gas at any time from well.

(USE REVERSE SIDE IF NEEDED)

### CERTIFICATION

"I state that I am authorized by said Owner or Operator to make this report; and that this report was prepared under my supervision and direction, and that the facts stated herein are true, correct and complete to the best of my knowledge."

NAME AND TITLE (Typed or Printed)

COMPANY NAME AND ADDRESS

HARRY L. MUTTON

**CITIZEN**

**SIGNATURE**

DATE (Month, Day, Year)

10-5-78

B-16

155TH - MAY 1971 - 20

717 611 42 000 9013F

1947: 1947

100-443887-100

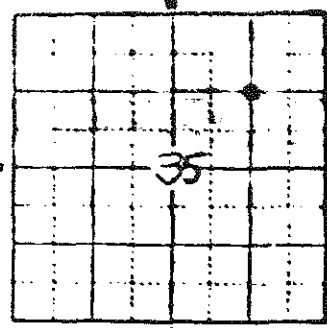
THE UNIVERSITY OF CHICAGO

APR 63 1972

STATE OF MICHIGAN  
DEPARTMENT OF CONSERVATION

LOG OF OIL, GAS OR TEST WELL

TO BE FILED WITH SUPERVISOR OF WELLS WITHIN 30 DAYS  
AFTER COMPLETION OF WELL (ACT 61 P. A. 1966  
AND ACT 250 P. A. 1967)



LOCATE WELL ACCORDING TO

Permit No. 28706  
 Owner or Operator Hersey Oil & Gas Company  
 Address Box 176 Reed City Mich 49677  
 Well No. 1 From Green-paine  
 County Uacolea Township Hersey  
 Location Center NE/4 Sec. 35 Twp. 17N Rng. 9W Elevation 1210.4 Level  
1320 ft. from South line and 1270 ft. from East line of quarter section  
 Type of well GAS Total depth 1638 ft Completed in Michigan stry  
 Name of producing formation Michigan stry Top of formation 1638ft  
 Date drilling began Feb. 11, 1972 Date drilling completed Feb 26, 1972  
 Drilling contractor Sibley, Madhou Address Jalkerville, Reed City

WATER ZONES

OIL OR GAS ZONES

Name	From	To	Amount	Name	From	To	Amount
	740	751	50Y	MICHIGAN STRY	1638	1643	3MM

CASING AND CEMENTING

STEEL LINES RUN

SIZE	Based On	Country	NOT PULLED	Run AT	CONNECTED TO	Run BY
5 1/2	740Y	200Y				
5 1/2	1512Y	55Y				

PERFORATIONS

ACID OR SHOOTING RECORD

Date	From	To	in HOURS	DATE	From	To	Gal. ACID or LBS. NITRO

Rotary tools from 0 feet to 1522ft Cable tools from 1522ft to 1638ft  
 Natural initial production first 24 hours 3MM After acid or shot Nil.  
 If gas well, cu ft. per 24 hours 3MM Rock pressure, lbs. per sq. in. 975

The above information is complete and correct.

Signed Thomas Fredell

Date March 30, 1972

Title

DD-16 Rev. 4/66

GIVE COMPLETE FORMATION RECORD ON REVERSE SIDE

SURVEY DIVISION - BOX 30028 - LANSING, MI 48209

SURVEY DIVISION - BOX 30028 - LANSING, MI 48209

J. O. Hatch  
130 East Jefferson St.  
Starling, Michigan 48459

April 9, 1962

Michigan Department of Natural Resources  
Oil and Gas Division  
Stevens T Mason Bldg.

Attn: Milt Gers

Dear Mr. Gers,

In response to your recent request for a driller's log from the Randolph #1 in Harsey Twp. of Oceaola County, please be informed that this well was drilled and plugged by a company known as Jaboor. At my request your agency transferred the permit to me. Apparently this was done without ever having received the required log from Jaboor. I did not receive a log from the original operator and have no knowledge of one having been prepared. Since the hole was originally drilled approximately twenty years ago, I have no way to obtain the requested information.

Sincerely,

J. O. Hatch

P.S. I have just talked with my son, Harry Hatch and he tells me that you gave him permission to deepen this well ten feet and in doing so, encountered more water so he plugged it and sent you proper papers and shortly after you requested the same papers he had sent in so he did it the second time.





STATE OF MICHIGAN  
DEPARTMENT OF NATURAL RESOURCES  
GEOLOGICAL SURVEY DIVISION

WELL PLUGGING RECORD

Submit in TRIPPLICATE Within 30 Days After Plugging is Completed

JUN 14 1979 M K

PERMIT NUMBER 28888
FIELD NAME Hersey Gas

COMPLETE NAME(S) AND ADDRESS OF WELL OWNER J.O. Mutch Sterling, Mich. 48659			
COMPLETE LEASE OR FARM NAME(S) Randolph, Prine, Thiel Unit # 1			WELL NUMBER
WELL LOCATION approx C NW 1/4 SEC. 35 T. 17N R. 9W		TOWNSHIP Hersey	COUNTY Osceola
TYPE OF WELL (Oil, Gas, Dry Hole, etc.) dry hole		TOTAL DEPTH 1600?	FORMATION stray
DATE PLUGGING STARTED 6-6-79	DATE PLUGGING COMPLETED 6-6-79	DEPT. REPRESENTATIVE(S) WHO ISSUED PERMIT OR WITNESSED PLUGGING Michael J. Moss	

CASING RECORD			
SIZE CASING	DEPTH SET	AMOUNT RECOVERED	SHOT OR RIPPED
8 5/8"	?	none	
7"	?	"	
5 1/2"	1600?	970'	ripped

BRIDGES OR PLUGS		
TYPE (Brush, Stone, Cement, Mechanical, etc.)	DEPTH PLACED	SACKS OF CEMENT AND ADDITIVES

Were tools, tubing, casing, etc., lost or left in the hole before or during plugging?

☐ YES ☒ NO

If yes, give details:

Did a Service Company pump mud, spot cement, or set bridge plugs?

☒ YES ☐ NO

If yes, give name and address:

Allied Services Mt. Pleasant

Was the well plugged by a Company or Contractor other than Owner or Operator?

☒ YES ☐ NO

If yes, give name and address:

Allied Services Mt. Pleasant

Representative of Owner, Operator, Company, or Contractor who witnessed plugging:

Harry L. Mutch-Larry Sibley

DESCRIBE IN DETAIL HOW WELL WAS PLUGGED

We dumped 15 sacks of cement on bottom with a bailer. Then we ripped 5 1/2" casing at 970 ft. and pumped mud in hole. We pulled casing to 750 ft and cemented with 60 sacks and pushed mud ahead of cement to surface. We set a bridge and filled to the surface of pipe with cement. We cut casing off below ground and welded plate on top.

(USE REVERSE SIDE IF NEEDED)

CERTIFICATION

"I state that I am authorized by said Owner or Operator to make this report, and that this report was prepared under my supervision and direction, and that the facts stated herein are true, correct and complete to the best of my knowledge."

NAME AND TITLE (Typed or Printed)

Harry L. Mutch

SIGNATURE

*Harry L. Mutch*

DATE (Month, Day, Year)

6-11-79

COMPANY NAME AND ADDRESS

J.O. Mutch  
Sterling, Mich. 48659

TO BE FILED WITH SUPERVISOR OF WELLS WITHIN 30 DAYS  
AFTER COMPLETION OF WELL, ACT ON P. A. 1989  
AND ACT 200 P. A. 1990:

..... **Wells, Inc.** .....

Box 176, Reed City, Mich. 19677

1 Donald Grein

Township **Barney** County **Osceola**

Center NY 46 17N 9W 1723 EL  
Location ..... Sec. ..... Twp. ..... Range ..... Elevation ..... 1026 HF

Footage 1320 .....ft. from south .....line and 1320 .....ft. from east .....line of quarter section

Type of well.....Gas.....Total depth.....1526.....Completed in.....Stray

Name of producing formation..... **Stray Sand** ..... Top of formation..... **1525**

Date drilling begun July 8, 1971 Date drilling completed Aug. 18, 1971 Date well completed Aug. 23, 1971

Drilling contractor..... Lewis C. Sibley (1500') ..... Walkerville, Mich.  
Operator (1500'-TW).....

[illegible]

CASING AND CEMENTING				STEEL LINES RUN		
SIZE	WHERE SET	CEMENT	AMT. PULLED	RUN BY	CONNECTED TO	RUN BY
8 5/8"	664	50 - 25		1500	1500	Dunsmuir Acid Samples
5"	1500	35 - 25				

[illegible]

Rotary tools from 0.....feet to.....1500 feet. Cable tools from.....1500.....feet to.....1526.....feet

Natural initial production first 24 hours.....Bbls. After acid or shot.....Bbls.

If gas well, cu ft. per 24 hours.....**2 181**.....Rock pressure, lbs. per sq. in.....**650**.....

The above information is complete and correct. Signed... *Frederick G. Norman*...

Date Sept. 9, 1971 Title Geologist

**GIVE COMPLETE FORMATION RECORD ON REVERSE SIDE (Subj. in Dialect)**

B-47

DNR	GEOLOGICAL	SURVEY	DIVISION	- BOX	30028	- LANSING,	MT	48908
DNR	GEOLOGICAL	SURVEY	DIVISION	- BOX	30028	- LANSING,	MT	48909
DNR	GEOLOGICAL	SURVEY	DIVISION	- BOX	30028	- LANSING,	MT	48908
DNR	GEOLOGICAL	SURVEY	DIVISION	- BOX	30028	- LANSING,	MT	48909
DNR	GEOLOGICAL	SURVEY	DIVISION	- BOX	30028	- LANSING,	MT	48908
DNR	GEOLOGICAL	SURVEY	DIVISION	- BOX	30028	- LANSING,	MT	48909

[illegible][illegible]

[illegible]

JAN 10 1972

3-28-72  
28

28710

A 4x4 grid with a central 2x2 square shaded black.

154578 WILL ACX: MATRI

Location: S SW/4 Sec. 36 Twp. 17N Range 9W Elevation 1172 GL  
 Footage: 1220 ft. from north line and 1270 ft. from west line of quarter section  
 Type of well: Shut in gas well Total depth: 1586 Completed in: Stray  
 (oil, gas, brine disposal, dry hole)  
 Name of producing formation: Stray Top of formation: 1585  
 Date drilling: Dec. 13, 1971 Date drilling completed: Dec. 27, 1971  
 Date well completed:

## WATER ZONES

014 00 048 200E5

## REVOLUTION SERVED

[illegible]

## CASING AND CEMENTING

STEEL LINES REBOND

SIZE	WHERE SET	CEMENT	AMT. PULLED	RUN BY	CORRECTED TO	RUN BY
8"	710	200 SEC		1556	1557	Operator
5"	1550	55 SEC				

## PERFORATIONS

ACID OR SHOOTING RECORD

[illegible]

Rotary tools from.....0.....feet to....1550.....feet. Cable tools from.....1550.....feet to....1586.....feet.

Natural initial production first 24 hours.....Bbls. After acid or heat.....Bbls

If gas well, cu ft. per 24 hours ~~Not yet tested~~..... Rock pressure        lbs. per sq. in. 800.....

The above information is complete and correct.

Signed: Frederick G. Newman

Date: Jan. 7, 1972

Title.....

Comp. 7210  
Rev. 9/64

**GIVE COMPLETE FORMATION RECORD ON REVERSE SIDE**

(Submit in Doubtless)

B-50

SA DIVISION	60X	3000	100	100
SA DIVISION	60X	3000	100	100
SA DIVISION	60X	3000	100	100

8 7237 273



CV 15 1971

PERMIT NUMBER 28710	DESIGNING PERMIT NUMBER DPF 1780	FIELD NAME Proctor Creek
NAME AND ADDRESS OF WELL OWNER HARRY L. Mutch 256 Lakeshire Rd. Battle Creek, Mich. 49015		
LEASE OR FARM NAME Thompson - Randolph		WELL NUMBER 3
WELL LOCATION Center of SW 1/4	SECTION 36	TOWNSHIP T. 17-N
		RANGE R. 9-W
		COUNTY Osceola
WELL COMPLETED FOR (Oil, Gas, Gas Storage, Brine Disposal, Water Injection, etc.) Gas	TOTAL DEPTH AFTER REWORK 1600 ft.	MECHANICAL LOGS (UN)
WELL COMPLETED IN (Name Rock Formation and Zone of Completion) Stray sand	DATE REWORK COMMENCED MAY 8, 1975	DATE REWORK COMPLETED MAY 9, 1975
NAME AND ADDRESS OF CONTRACTOR Lewis Sibley Walkerville, Michigan		

**WELL CASING RECORD - BEFORE REWORK**

Casing		Cement		Perforations		Acid or Fracture Treatment Record	Perforations If plugged, How?
Size	Depth	Sacks	Type	From	To		
8 5/8"	710	200					
5 1/2"	1550'	55		none		none	none

## WELL CASING RECORD - AFTER REWORK (Indicate additions and changes only)

Casing		Cement		Perforations		Acid or Fracture Treatment Record	Perforations plugged, how?
Size	Depth	Seals	Type	From	To		
9 5/8"	710'	200					
5 1/2"	7550'	55		none		none	none

**DESCRIBE REWORK OPERATIONS IN DETAIL**

We deepened the well from 1587 ft. to 1600 ft. We got some salt water so we plugged back 10 ft. to 1590.

IMPORTANT! SEE REVERSE SIDE

B-52

TELEOLOGICAL SURVEY DIVISION - BOX 3002A - LAUNING, MI 48909  
TELEOLOGICAL SURVEY DIVISION - BOX 3002A - LAUNING, MI 48909  
TELEOLOGICAL SURVEY DIVISION - BOX 3002A - LAUNING, MI 48909  
TELEOLOGICAL SURVEY DIVISION - BOX 3002A - LAUNING, MI 48909

STREET DIVISION	-	BOX	30928	-	LANSHIRE	MI	48101
STREET DIVISION	-	BOX	30026	-	LANSHIRE	MI	48101
STREET DIVISION	-	BOX	30028	-	LANSHIRE	MI	48101
STREET DIVISION	-	BOX	30028	-	LANSHIRE	MI	48101
STREET DIVISION	-	BOX	30028	-	LANSHIRE	MI	48101
STREET DIVISION	-	BOX	30028	-	LANSHIRE	MI	48101



# U.S. ENVIRONMENTAL PROTECTION AGENCY

## NOTICE OF INSPECTION

Address (EPA Regional Office)  
U.S.E.P.A. Region V  
77 W. Jackson  
WU - 16 - J  
Chicago, IL 60604

**Talib Syed & Associates, Inc.**  
3595 S. Teller Street  
Suite #405  
Lakewood, Co 80235  
(303) 969-0685

Firm To Be Inspected  
*IME POTASH*  
*HERSEY, MI*

Date *10-21-2002*  
Hour *9:30 A.*

Notice of inspection is hereby given according to Section 1445(b) of the Safe Drinking Water Act (42 U.S.C. §300 f et seq.).

### Reason For Inspection

For the purpose of inspecting records, files, papers, processes, controls and facilities, and obtaining samples to determine whether the person subject to an applicable underground injection control program has acted or is acting in compliance with the Safe Drinking Water Act and any applicable permit or rule.

*MIT - TD2-009*

*WELL # 1841 MDER # 366-969-767 P.*

*MI-133-36-ACC2*

Section 1445(b) of the SDWA (42 U.S.C. §300 j-4 (b) is quoted on the reverse of this form.

Receipt of this Notice of Inspection is hereby acknowledged.

Firm Representative

Date

Inspector

*Bill Hicks*

*10-21-2002*

*Charles E. Lamm*

# ANNULAR PRESSURE TEST

OPERATOR I M C POTASH STATE PERMIT NO. 366-904-767  
 ADDRESS \_\_\_\_\_ EPA PERMIT NO. M1-133-36-A002  
HERSEY, MI. DATE OF TEST 10-21-2002  
 WELL NAME WELL # 1041 TYPE 3-G  
 LOCATION SW QUARTER OF THE NW QUARTER OF THE NW QUARTER.  
 SECTION 26 TOWNSHIP 17N RANGE 9W  
 TOWNSHIP NAME HERSEY COUNTY NAME OSCEOLA  
 COMPANY REPRESENTATIVE BILL HICKS FIELD INSPECTOR C. BROWN  
 TYPE PRESSURE GAUGE 4x8 \* INCH FACE, NA. PSI FULL SCALE, 46 0.00 Hundreds PSI INCREMENTS  
 NEW GAUGE YES ☐ NO ☒ IF NO, DATE OF TEST CALIBRATION 10-11-2000  
 CALIBRATION CERTIFICATION SUBMITTED: YES ☐ NO ☐ \* PAROSCIENTIFIC DIGITAL

## RESULTS:

PRESSURE (PSIG)			
TIME	ANNULUS	TUBING	CASING <u>7"</u>
<u>0</u>	<u>1820.3</u>	<u>NA</u>	TUBING <u>2 7/8"</u>
<u>15</u>	<u>1820.1</u>	<u>NA</u>	PACKER <u>ARROW SET 1 comp.</u>
<u>30</u>	<u>1820.0</u>	<u>NA</u>	PACKER @ <u>6110'</u>
			FLUID RETURN @ <u>NA</u>
			COMMENTS: <u>TD 2-009</u>
			<u>5yr.</u>

## TEST PRESSURE:

MAX. ALLOWABLE PRESSURE CHANGE: TEST PRESSURE X .03 54.6 PSI  
 HALF HOUR PRESSURE CHANGE -0.3 PSI

TEST PASSED ☒ TEST FAILED ☐ (CHECK ONE)

IF FAILED, NO INJECTION MAY OCCUR UNTIL CORRECTIONS HAVE BEEN MADE AND WELL PASSES.

Bill Hicks  
 SIGNATURE OF COMPANY REPRESENTATIVE

Charles L. Brown  
 SIGNATURE OF INSPECTOR

10-21-2002  
 DATE

10-21-2002  
 DATE

## CERTIFICATE OF CONFORMANCE

CUSTOMER: IMC PATASH HERSEY

PURCHASE ORDER: 38875

TRANSDUCER MODEL: 760-2K

PART NUMBER: 1107-033-0

SERIAL NUMBER(S): 47973

*PAROSCIENTIFIC INCORPORATED certifies that the part(s) identified above complies with the requirements of the above order and has been manufactured in accordance with engineering drawings, material and process specifications, testing procedures, and applicable specification drawing of Paroscientific Incorporated. The transducer(s) identified has been calibrated and tested over the specified pressure and temperature range and meets the requirements of the applicable specification drawing. Primary pressure, temperature standards and transfer standards used at Paroscientific Incorporated for calibration and testing have traceability to the National Institute of Standards and Technology and are regularly checked and calibrated according to Paroscientific QA Procedure Q8521, Inspection Test and Measurement Equipment, in accordance with the requirements of ISO 9001.*

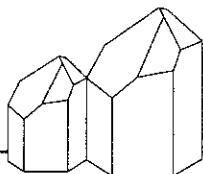


AUTHORIZED SIGNATURE

Warren Schuchman, Quality Assurance

10/11/00

DATE



Digiquartz® Pressure Instrumentation

Document No. T8148, Rev."M", 5May00

Page 1 of 2



PAROSCIENTIFIC, INC.  
4500 148th Ave. N.E.  
Redmond, WA 98052  
Tel: (425) 883-8700  
Fax: (425) 867-5407

Customer: IMC POTASH HERSEY  
1395 135TH AVENUE  
HERSEY, MI 49639

Date: 10-11-2000

Sales Order: 17238 S/R 6311

STATUS REPORT OF INTELLIGENT TRANSMITTER  
-----

Serial Number: 47973  
Model: 760-2K  
Pressure Range: 0 to 2,000 psia  
Port: oil filled

Configuration -----	Calibration Coefficients -----
VR: 60.07	PA: .0000000
SN: 47973	PM: 1.000000
ID: 01	TC: .6890829
BR: 9600	
PT: N	U0: 5.818638
	Y1: -3938.544
DP: 6	Y2: -12827.45
	Y3: -72887.10
MD: 1	
MC: Y	C1: -8514.146
	C2: -126.7054
UN: 1	C3: 19475.25
UF: 1.000000	
PR: 00238	D1: .0496718
TR: 00952	D2: .0000000
OP: 2100.000	T1: 29.98833
ZS: 0	T2: .8126916
ZV: .0000000	T3: 44.05520
	T4: 17.41595
	T5: 715.5318

Prepared by: T.Chau





# Paroscientific, Inc.

4500 148th Avenue N.E., Redmond WA 98052 U.S.A.  
Tel. (425) 883-8700, FAX (425) 867-5407

## SERVICE REPORT SR 6311 Amendment 01 8/29/2000 LK Amendment 02 9/9/2000 LK

DATE OF RECEIPT : August 22, 2000  
CUSTOMER : IMC Potash/Salt  
CUSTOMER CONTACT : Kyle Barbot TEL 231-832-1237  
FAX 231-832-3349

CUSTOMER ORDER #	:			
MODEL	S/N	PN	S/D	CUSTOMER COMMENT
760-2K	47973	1107-033-0	6/93	Bad battery, call with est.

### ANALYSIS

Unit arrived in-operative. The pressure port line had been spun resulting in the internal tubing twisted and the panel fitting pulled from the panel. Salt corrosion has damaged the case, internal electronics and pressure lines.

### CORRECTIVE ACTION

Replace the complete mechanical and electronic package, install the 42K transducer s/n 47973 and restore to original PN 1107-033-0 \$1625.  
Vacuum oil fill \$150. Zero adjust calibration \$395. Total \$2170.

Note, a complete new model 760-2K, PN 1107-033-0 is listed at \$5575.

### DATE ANALYSIS COMPLETED

August 22, 2000 L. Kezner

### CHARGES

\$2170

### S. O. INSTRUCTIONS

Replace the complete mechanical and electronic package, install the 42K transducer s/n 47973 and restore to original PN 1107-033-0. Vacuum oil fill. Zero adjust calibration.

---

Paroscientific, Inc.

CERTIFICATE OF CALIBRATION

TRANSDUCER MODEL: 760-2K

SERIAL NUMBER: 47973

The Paroscientific transducer(s) identified above has been calibrated and tested with one or more of the following primary pressure and temperature standards. All have traceability to the National Institute of Standards and Technology.

Bell and Howell Primary Pressure Standard

Pneumatic Absolute or Gauge Dead Weight Tester Part Number: 6-201-0001, S/N 4034 and S/N 1014

— Piston/Cylinder: 6-001-0002, P2-919/C2-1523,

Weight Set 1: 6-002-0002

Range: 1.5 to 50 psi [10 to 345 kPa]

Accuracy: 0.010 percent of reading

✓

Piston/Cylinder: 6-001-0002, P2-652/C2-1378,

Weight Set 2: 6-002-0002

Range: 1.5 to 50 psi [10 to 345 kPa]

Accuracy: 0.010 percent of reading

— Piston/Cylinder: 6-001-0001, P1-949/C1-922,

Weight Set 2: 6-002-0002

Range: 0.3 to 5 psi [2 to 34 kPa]

Accuracy: 0.015 percent of reading

DH Primary Pressure Standard

Pneumatic Absolute or Gauge Dead Weight Tester Part Number: PG7601 S/N 161

— Piston/Cylinder: S/N 305, Mass Set: S/N 2052

Range: 0.7 to 50 psi [5 to 345 kPa] absolute mode, 0.29 to 50 psi [2 to 345 kPa] gauge mode

Accuracy: 0.002 percent of reading

DH Primary Pressure Standard

Pneumatic Gauge Dead Weight Tester, Model 5203, S/N 5557

— Piston/Cylinder: S/N 4845, Mass Sets: S/N 2032, S/N 3293

Range: 20 to 1,600 psi [0.14 to 11 MPa]

Accuracy: 0.005 percent of reading

DH Primary Pressure Standard

Oil Operated Gauge Dead Weight Tester, Model 5306, S/N 3505

✓ Piston/Cylinder: S/N 3375, Mass Set: S/N 2032

Range: 40 to 20,000 psi [0.3 to 138 MPa]

Accuracy: 0.01 percent of reading above 200 psi [1.4 MPa]

or 0.02 psi [0.14 kPa] at lower pressure

— Piston/Cylinder: S/N 3511, Mass Set: S/N 2032

Range: 145 to 72,500 psi [1 to 500 MPa]

Accuracy: 0.02 percent of reading above 725 psi [5 MPa]

or 0.145 psi [1 kPa] at lower pressure

Hart Scientific Precision Thermometer (MET3A only)

— Black Stack model 1560 S/N 97155, Thermistor Probes Model 5611T:

S/Ns 972711, 972713, 972715, 972718, 972719 and 972721.

Range: -50° to 60° C.

Accuracy: .015°C.

Tested By: 



DATE 10-11-00



## CERTIFICATION OF TRACEABILITY TO NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY

*Primary pressure and temperature standards used in the calibration and testing of Paroscientific pressure transducers or Meteorological Systems have traceability to the National Institute of Standards and Technology through the following documentation.*

### Bell and Howell Primary Pressure Standard:

Bell and Howell, Model 6-201-0001, Piston/Cylinder P2-919/C2-1523 via DH Calibration Report No. 15441 traceable to NIST. Weight Set 1, P/N 6-002-0002, via DH Calibration Report No. 14481 traceable to NIST. Weight Set 2, P/N 6-002-0002, via DH Calibration Report No. 14576 and 16603 traceable to NIST. Piston/Cylinder P2-652/C2-1378 via DH Instruments Calibration Report No. 14575 and 16602 traceable to NIST. Piston/Cylinder P1-231/C1-384 via DH Instruments Calibration Report No. 13170 traceable to NIST. Piston/Cylinder P/N 6-201, No. P1-949/C1-922, via DH Instruments Calibration Report 15440, traceable to NIST.

### DH Primary Pressure Standard, Oil Operated Gauge:

DH Instruments, Model 5306, Piston/Cylinder S/N 3375, via DH Calibration Certificate Report No. 8398 and 22146 traceable to NIST. Piston/Cylinder 3511 via DH Calibration Report No. 8399 and 22147 traceable to NIST. Mass Set S/N 2032 via DH Calibration Report No. 4630 traceable to NIST.

### DH Primary Pressure Standard, Pneumatic Operated Gauge:

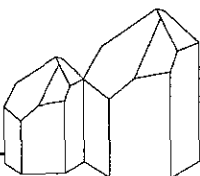
DH Instruments, Model 5203, Piston/Cylinder S/N 4845, via DH Calibration Certificate No. 8541 traceable to NIST. Mass Set S/N 2032/3293 via DH Calibration Certificate Nos. 4630 and 8540 traceable to NIST.

### DH Primary Pressure Standard, Pneumatic Operated Gauge:

DH instruments, Model PG7601, Piston/Cylinder S/N 305 via DH Instruments Calibration No. 20281 traceable to NIST. DH Instruments 35 kg Mass Set No. 2052 and Bell No. 261A via DH Instruments Calibration Report No. 20282 traceable to NIST.

### Hart Scientific Precision Thermometer (MET3A only):

Hart Scientific, Black Stack Model 1560 Serial Number 97155, Thermistor Probe Model 5611T Serial Numbers 972711, 972713, 972715, 972718, 972719 and 972721, traceable to NIST via report numbers 972053, 980530, 980531, 980532, 980533, 980534 and 980535.



# ANULAR PRESSURE TEST

OPERATOR KALIAM PHEM. STATE PERMIT NO. 366-904-767  
 ADDRESS 1395 135TH AVE. EPA PERMIT NO. MI-133-36-A002  
HERSEY, MI. 49639 DATE OF TEST 3-29-95  
 WELL NAME # 1041 TYPE 3-6  
 LOCATION SW QUARTER OF THE NW QUARTER OF THE NW QUARTER.  
 SECTION 26 TOWNSHIP 17N RANGE 9W  
 TOWNSHIP NAME HERSEY COUNTY NAME OSCEOLA  
 COMPANY REPRESENTATIVE LARRY BEAN FIELD INSPECTOR C. BROWN  
 TYPE PRESSURE GAUGE 4x8 INCH FACE, \* PSI FULL SCALE, \_\_\_\_\_ PSI INCREMENTS  
 NEW GAUGE YES ☐ NO ☐ IF NO, DATE OF TEST CALIBRATION \_\_\_\_\_  
 CALIBRATION CERTIFICATION SUBMITTED: YES ☐ NO ☐

RESULTS: \* DIGITAL QUARTZ

TIME	PRESSURE (PSIG)	
	ANNULUS	TUBING
0	1967 psi	SHUT-IN
15	1967 "	
30	1966 "	
45	1965 "	
60	1965 "	

CASING 7"  
 TUBING 2 7/8"  
 PACKER BAKER A-3 Comp.  
 PACKER @ 6230'  
 FLUID RETURN @ \_\_\_\_\_

COMMENTS:

TEST PRESSURE:  
 MAX. ALLOWABLE PRESSURE CHANGE: TEST PRESSURE X .03 59 PSI  
 HALF HOUR PRESSURE CHANGE -2 PSI

TEST PASSED ☒ TEST FAILED ☐ (CHECK ONE)  
 IF FAILED, NO INJECTION MAY OCCUR UNTIL CORRECTIONS HAVE BEEN MADE AND WELL PASSES.

Larry Bean SIGNATURE OF COMPANY REPRESENTATIVE 3-29-95 DATE  
Charles E. Brown SIGNATURE OF INSPECTOR 3-29-95 DATE

# U.S. ENVIRONMENTAL PROTECTION AGENCY

## NOTICE OF INSPECTION

<b>Address (EPA Regional Office)</b> Region V, 5WD-TUB-9 230 S. Dearborn St. Chicago, IL 60604	<b>Inspection Contractor</b> <b>THE CADMUS GROUP, INC.</b> CORPORATE OFFICE 135 Beaver Street Waltham, MA 02154 (617) 894-9830	<b>Firm To Be Inspected</b> <i>Kalium CHEM</i>  <i>HERSEY, MI.</i>
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Date *7-3-90*

Hour *9:30*

Notice of inspection is hereby given according to Section 1445(b) of the Safe Drinking Water Act (42 U.S.C. §300 f et seg.).

### Reason For Inspection

For the purpose of inspecting records, files, papers, processes, controls and facilities, and obtaining samples to determine whether the person subject to an applicable underground injection control program has acted or is acting in compliance with the Safe Drinking Water Act and any applicable permit or rule.

*M.I.T. class VIII - G*

*WELL # 1041*

Section 1445(b) of the SDWA (42 U.S.C. §300 j-4 (b) is quoted on the reverse of this form.

Receipt of this Notice of Inspection is hereby acknowledged.

<b>Firm Representative</b> <i>ACD Mann</i>	<b>Date</b> <i>7-3-90</i>	<b>Inspector</b> <i>Charles E. Brown</i>
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# ANNULAR PRESSURE TEST

OPERATOR KALIAM CHEM STATE PERMIT NO. 366-904-767  
 ADDRESS 11461 S. 135TH EPA PERMIT NO. MIA-133-3G-0001  
HERSEY, MI. 49639 DATE OF TEST 7-3-90  
 WELL NAME WELL # 1041 TYPE III - G  
 LOCATION SW QUARTER OF THE NW QUARTER OF THE NW QUARTER.  
 SECTION 26 TOWNSHIP 17N RANGE 9W  
 TOWNSHIP NAME HERSEY COUNTY NAME OSCEOLA  
 COMPANY REPRESENTATIVE JIM MUMM FIELD INSPECTOR C. BROWN  
 TYPE PRESSURE GAUGE 4 INCH FACE, 1500 PSI FULL SCALE, 20 PSI INCREMENTS  
 NEW GAUGE YES ☒ NO ☐ IF NO, DATE OF TEST CALIBRATION \_\_\_\_\_  
 CALIBRATION CERTIFICATION SUBMITTED: YES ☐ NO ☐

## RESULTS:

TIME	PRESSURE (PSIG)	
	ANNULUS	TUBING
10:10 A.	1445 PSI.	SHUT-IN
10:40 A.	1430 "	" "
11:10 A.	1425 "	" "

CASING 7"  
 TUBING 2 7/8"  
 PACKER 3 Cup MANOREL PACKER  
 PACKER @ 7848'

FLUID RETURN @ \_\_\_\_\_

COMMENTS:

## TEST PRESSURE:

MAX. ALLOWABLE PRESSURE CHANGE: TEST PRESSURE X .03 43.35 PSI  
 HALF HOUR PRESSURE CHANGE -20 PSI

TEST PASSED ☒ TEST FAILED ☐ (CHECK ONE)

IF FAILED, NO INJECTION MAY OCCUR UNTIL CORRECTIONS HAVE BEEN MADE AND WELL PASSES.

SIGNATURE OF COMPANY REPRESENTATIVE

SIGNATURE OF INSPECTOR

DATE

DATE



Township and Range SE/4 OF S22; S/2 OF S23; E/2 OF S27  
 Location ALL S 26 - NE/4 OF S34; N/2 OF S35, T17N R 9W.  
 County OSCEOLA  
 UIC Permit Number MI-133-3G-A002  
 Operator Name KALIAM CHEMICALS, Ltd.  
 Well Name HERSEY POTASH FACILITY  
 State Permit Number 348-845-267; 348-845-267; 048-855-567  
 Reviewer's Name P. SAIEH

# CLASS II PERMIT TECHNICAL REVIEW SHEET

DIRECTIONS: If a technical parameter is NOT APPLICABLE for this review please indicate by entering 'NA' on the corresponding line.  
 ALL SECTIONS OF THIS FORM MUST BE COMPLETED.

## I. STATUS OF WELL:

Newly Drilled/Converted/Existing/Commercial Date? 1984 & 1985

## II. AREA OF REVIEW: Not applicable for existing wells.

18 Number of wells in area of review which penetrate the injection zone.

T.A.ed 0 Construction Adequate? N/A

P.A.ed 2 Acceptable State Affidavit Provided? YES

Producers 6 Construction Adequate? YES

Injectors 2 Construction Adequate? YES

SOLUTION MINING 8

## III. UNDERGROUND SOURCES OF DRINKING WATER (USDW):

Formation name of lowest USDW: GLACIAL DRIFT

Depth to bottom of lowest USDW: 672 FEET

Method used to determine USDW information: FORMATION RECORDS FROM NEARBY WELL

## IV. GEOLOGIC DATA OF CONFINING AND INJECTION ZONES:

	INJECTION	CONFINING ZONE & SYSTEM
FORMATION NAME	<u>A-1 EVAPORITE</u>	<u>A-1 CARBONATE</u>
LITHOLOGY	<u>SALT</u>	<u>LIMESTONE &amp; DOLOMITE</u>
DEPTH (TO TOP)	<u>7479</u>	<u>7422</u>
THICKNESS	<u>417</u>	<u>57</u>
FRACTURE GRADIENT	<u>0.8</u>	<u>N/A</u>

DETERMINATION OF FRACTURE PRESSURE:

N/A Field Rules: Only applicable for EOR Wells.

N/A Fracture Data: Use the I.S.I.P.

YES Equation:  $[(0.8 \text{ psi/ft} - (0.433(S_g))) \times \text{depth}] - 14.7 \text{ psi} = \text{psig.}$

N/A Other (explain)

V. OPERATING DATA:

Maximum Allowable Injection Pressure: 1823 PSIG.

Specific Gravity of Injection Fluid: 1.23 + 0.05 = 1.28 <sup>(S.F.)</sup>.

Composition of Annulus Fluid: N/A.

VI. WELL CONSTRUCTION:

Total Depth \_\_\_\_\_ ft.

*See attached pages for individual well construction*

Type of completion: Open Hole / Perforated ?

Location of Perforations / Open Hole: \_\_\_\_\_ ft.

Packer Depth: \_\_\_\_\_ ft. Set w/in or below the immediate confining system?  
Set w/in a cemented interval? \_\_\_\_\_

Location of Top of Cement adjacent to casing: (Calculate with at least a 20% excess)

Surface: \_\_\_\_\_ ft.

Intermediate: \_\_\_\_\_ ft.

Long String: \_\_\_\_\_ ft.

Liner: \_\_\_\_\_ ft.

Proof of Cement Provided by:

\_\_\_\_\_ Signed State Completion Report

\_\_\_\_\_ Cementing Ticket.

\_\_\_\_\_ Cement Bond Log.

\_\_\_\_\_ Temperature / Noise Log.

	DEPTH	SIZE
CASING		
HOLE		
CASING		
HOLE		
PACKER DEPTH		
CASING		
HOLE		
DEPTH		
PRTD		
TD		

VII. MECHANICAL INTEGRITY: Pass / Fail.

Type of MIT TO BE SCHEDULED IN THE PERMIT  
Conditions \_\_\_\_\_  
Date of MIT \_\_\_\_\_

VIII. PLUGGING & ABANDONMENT PLAN: If all 5 of the criteria listed below are met the Plugging & Abandonment Plan is adequate.

- N/A Uncemented Casing Ripped out.  
YES Plug @ least 250' above injection zone OR mechanical plug w/ 50' on top.  
N/A Plug @ least 50' above & below rip point.  
N/A INDIANA: Plug @ least 50' below lowest USDW to surface.  
YES MICHIGAN: IF NOT CMT. TO SURFACE, plug @ least 50' below lowest USDW to surface. IF CMT. TO SURFACE, plug @ least 50' below lowest USDW to 50' into the surface casing AND from 50' to the surface.

Justify any variation from the above: \_\_\_\_\_

IX. FINANCIAL ASSURANCE:

Type FINANCIAL STATEMENT COVERAGE  
Amount N/A  
Provider N/A  
Standby Trust Provided N/A

IF Blanket Bond Coverage:

- N/A Form VII-10 Acceptable.  
N/A Amount equal to 10 times the cost to plug the most expensive injection well in the field or 75% of the total cost.  
N/A List of ALL wells covered under the blanket bond provided.

IF State Bond Coverage:

- N/A Letter from operator (of intent to use State Bond) provided.  
N/A Copy of State Bond provided.

X. REMEDIAL ACTION / SPECIAL PERMIT CONDITIONS:

NONE Required.

Patrick Laich 12/16/91



$13\frac{3}{8}"$  and  $17\frac{1}{2}"$  →  $1.4396 \text{ FT/FT}^3$   
 $9\frac{5}{8}"$  and  $12\frac{1}{4}"$  →  $3.1430 \text{ FT/FT}^3$   
 $7"$  and  $8\frac{1}{2}"$  →  $7.8859 \text{ FT/FT}^3$

KCL 1011

SURFACE CASING:  $13\frac{3}{8}"$

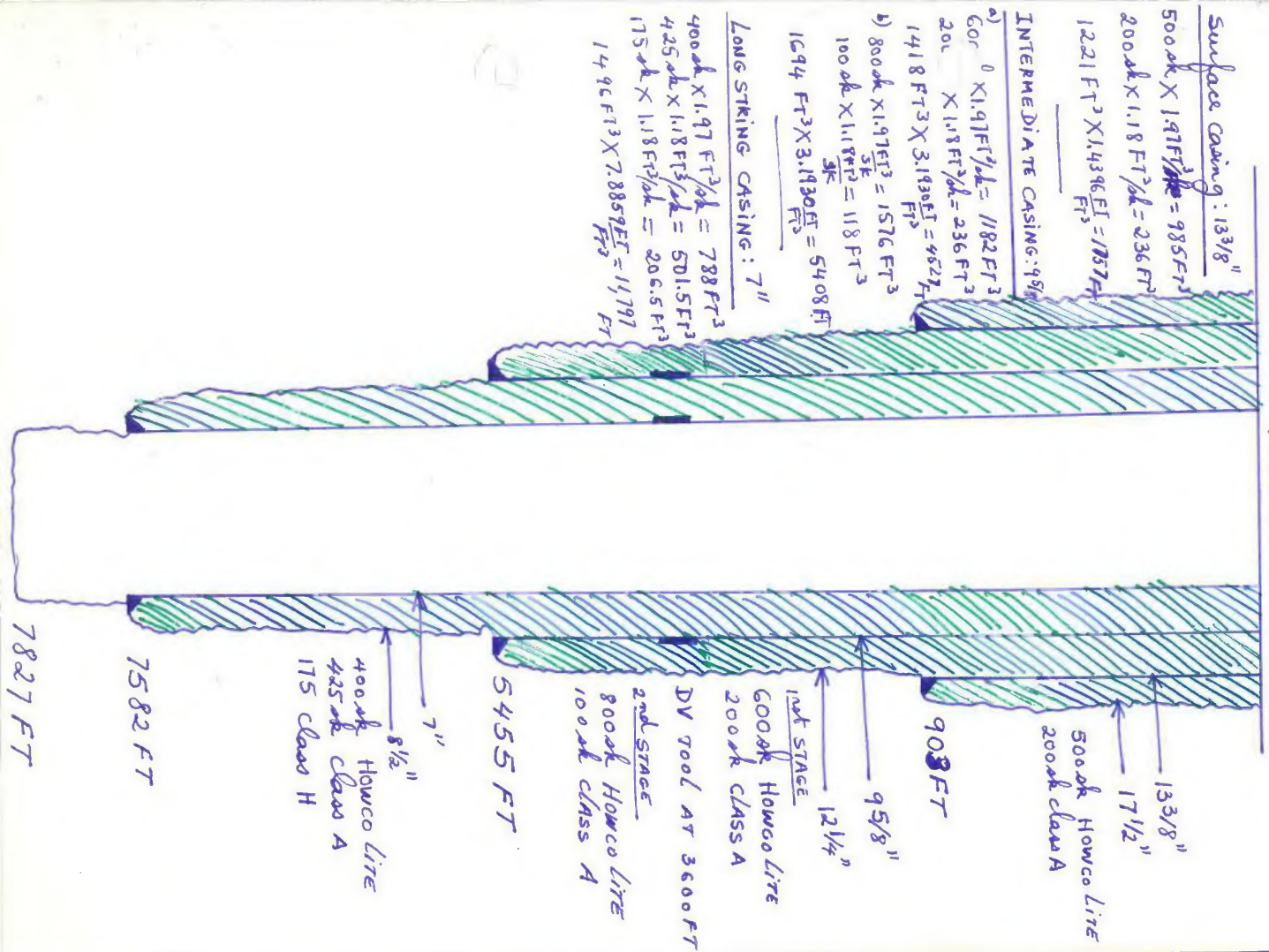
$500 \text{ sk} \times 1.91 \text{ FT}^3/\text{sk} = 955 \text{ FT}^3$   
 $200 \text{ sk} \times 1.18 \text{ FT}^3/\text{sk} = 236 \text{ FT}^3$   
 $120 \text{ FT}^3 \times 1.4396 \text{ FT}^3/\text{FT}^3 = 173 \text{ FT}^3$

INTERMEDIATE CASING:  $9\frac{5}{8}"$

a)  $600 \text{ sk} \times 1.91 \text{ FT}^3/\text{sk} = 1182 \text{ FT}^3$   
 $200 \text{ sk} \times 1.18 \text{ FT}^3/\text{sk} = 236 \text{ FT}^3$   
 $1418 \text{ FT}^3 \times 3.1430 \text{ FT}^3/\text{FT}^3 = 4527 \text{ FT}^3$   
 b)  $800 \text{ sk} \times 1.91 \text{ FT}^3/\text{sk} = 1576 \text{ FT}^3$   
 $100 \text{ sk} \times 1.18 \text{ FT}^3/\text{sk} = 118 \text{ FT}^3$   
 $1694 \text{ FT}^3 \times 3.1430 \text{ FT}^3/\text{FT}^3 = 5408 \text{ FT}^3$

LONG STRING CASING:  $7"$

$400 \text{ sk} \times 1.91 \text{ FT}^3/\text{sk} = 788 \text{ FT}^3$   
 $425 \text{ sk} \times 1.18 \text{ FT}^3/\text{sk} = 501.5 \text{ FT}^3$   
 $175 \text{ sk} \times 1.18 \text{ FT}^3/\text{sk} = 206.5 \text{ FT}^3$   
 $1496 \text{ FT}^3 \times 7.8859 \text{ FT}^3/\text{FT}^3 = 11,791 \text{ FT}^3$



$18\frac{5}{8}"$  and  $24"$  →  $0.8003 \text{ FT/FT}^3$   
 $13\frac{3}{8}"$  and  $17\frac{1}{2}"$  →  $1.4396 \text{ FT/FT}^3$   
 $9\frac{5}{8}"$  and  $12\frac{1}{4}"$  →  $3.1430 \text{ FT/FT}^3$   
 $7"$  and  $8\frac{1}{2}"$  →  $7.8859 \text{ FT/FT}^3$

KCL 1012

SURFACE CASING:  $18\frac{5}{8}"$

$100 \text{ sk} \times 1.18 \text{ FT}^3/\text{sk} = 118 \text{ FT}^3$

INTERMEDIATE CASING:  $13\frac{3}{8}"$

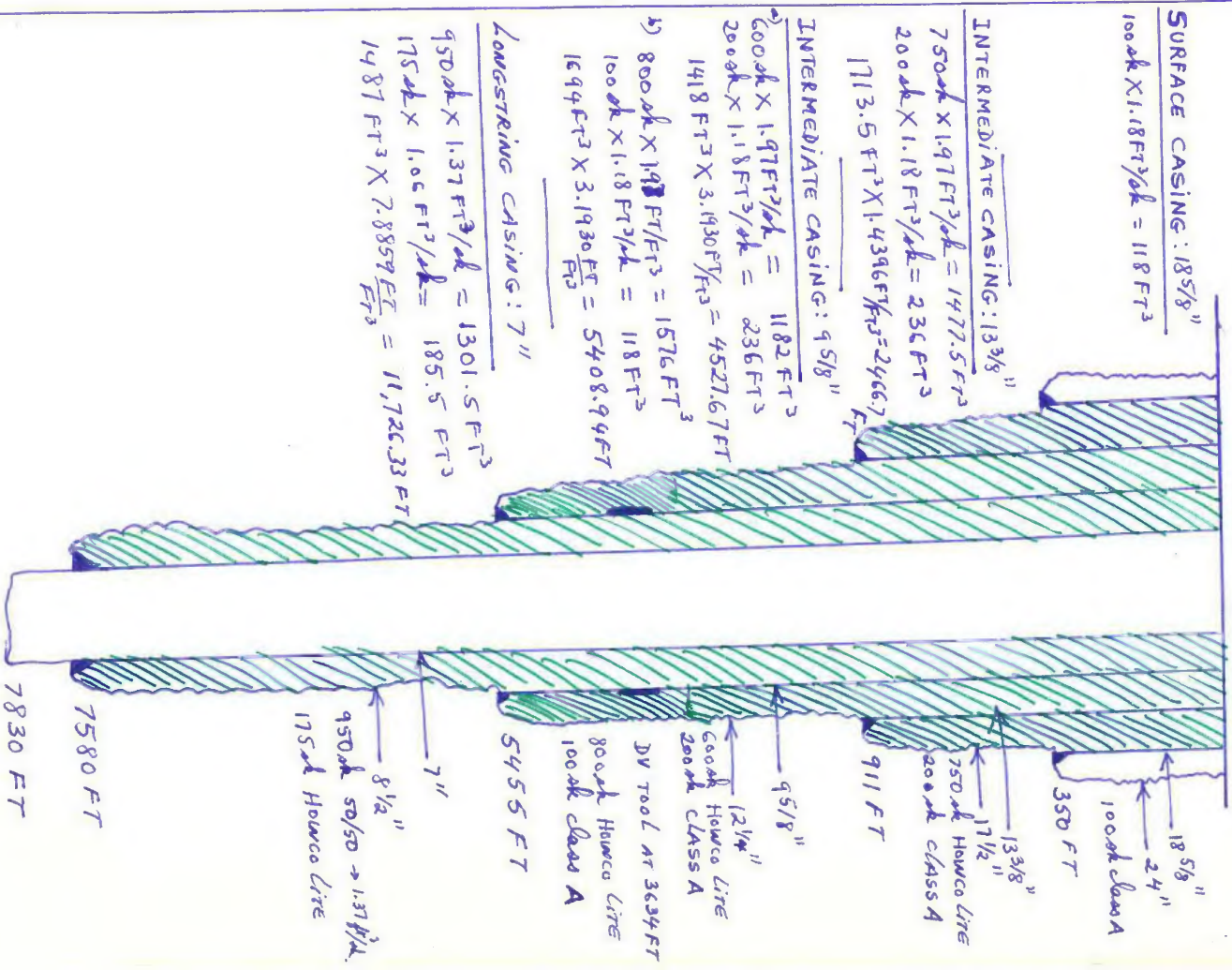
$750 \text{ sk} \times 1.91 \text{ FT}^3/\text{sk} = 1477.5 \text{ FT}^3$   
 $200 \text{ sk} \times 1.18 \text{ FT}^3/\text{sk} = 236 \text{ FT}^3$   
 $1173.5 \text{ FT}^3 \times 1.4396 \text{ FT}^3/\text{FT}^3 = 2466.7 \text{ FT}^3$

INTERMEDIATE CASING:  $9\frac{5}{8}"$

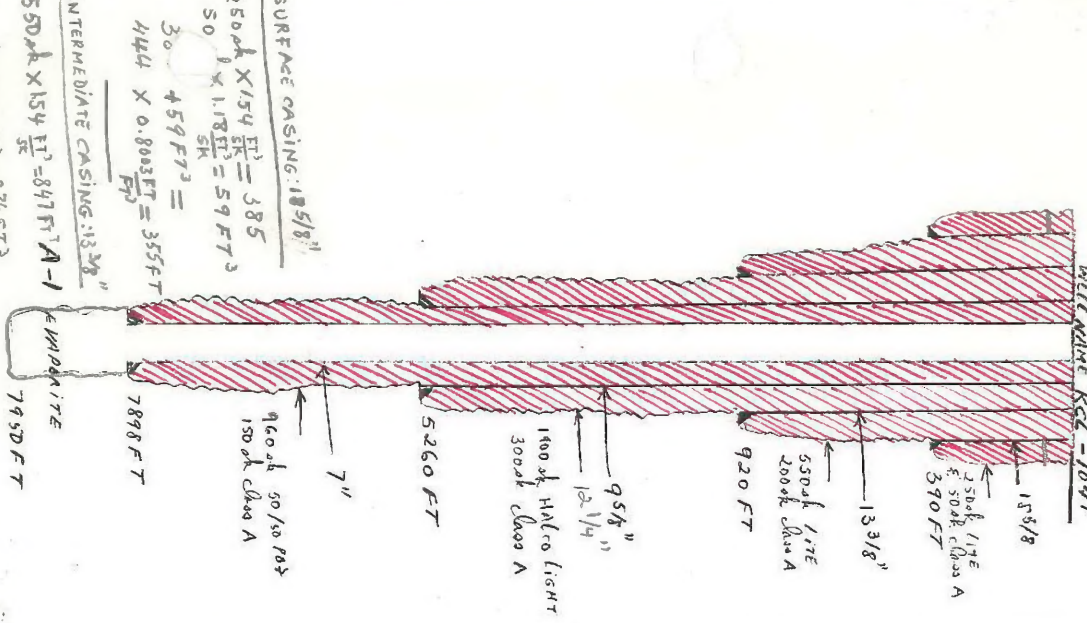
a)  $600 \text{ sk} \times 1.91 \text{ FT}^3/\text{sk} = 1182 \text{ FT}^3$   
 $200 \text{ sk} \times 1.18 \text{ FT}^3/\text{sk} = 236 \text{ FT}^3$   
 $1418 \text{ FT}^3 \times 3.1430 \text{ FT}^3/\text{FT}^3 = 4527.67 \text{ FT}^3$   
 b)  $800 \text{ sk} \times 1.91 \text{ FT}^3/\text{sk} = 1576 \text{ FT}^3$   
 $100 \text{ sk} \times 1.18 \text{ FT}^3/\text{sk} = 118 \text{ FT}^3$   
 $1694 \text{ FT}^3 \times 3.1430 \text{ FT}^3/\text{FT}^3 = 5408.94 \text{ FT}^3$

LONG STRING CASING:  $7"$

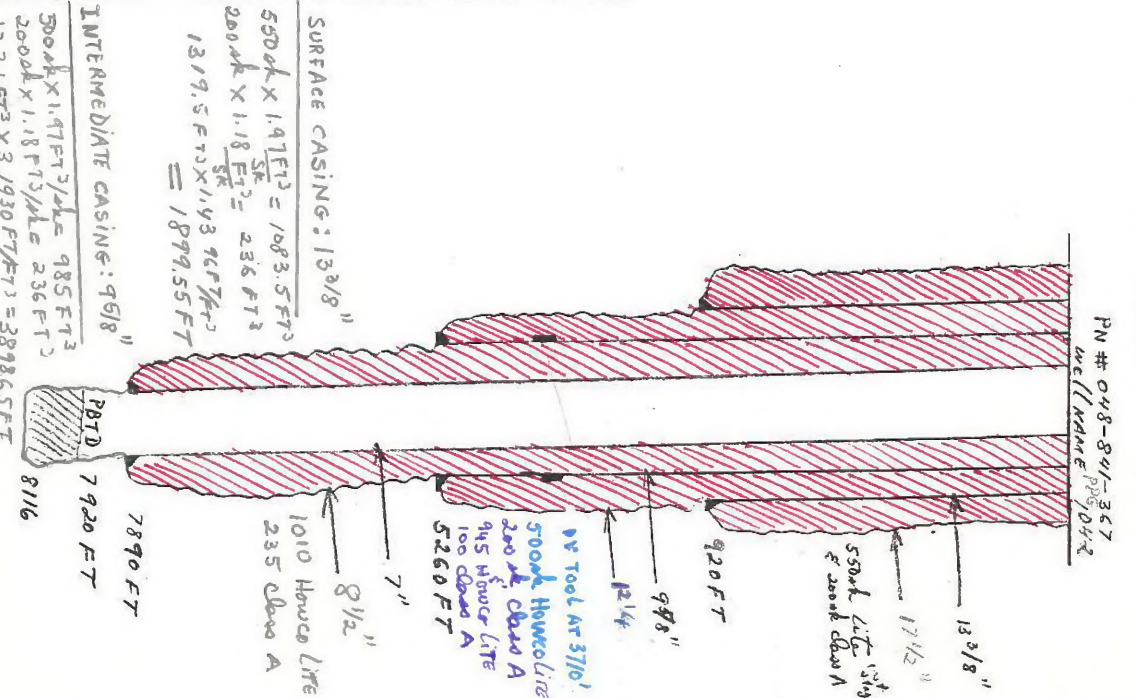
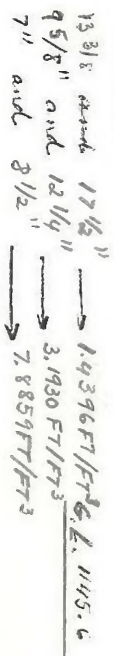
$950 \text{ sk} \times 1.37 \text{ FT}^3/\text{sk} = 1301.5 \text{ FT}^3$   
 $175 \text{ sk} \times 1.06 \text{ FT}^3/\text{sk} = 185.5 \text{ FT}^3$   
 $1487 \text{ FT}^3 \times 7.8859 \text{ FT}^3/\text{FT}^3 = 11,726.33 \text{ FT}^3$



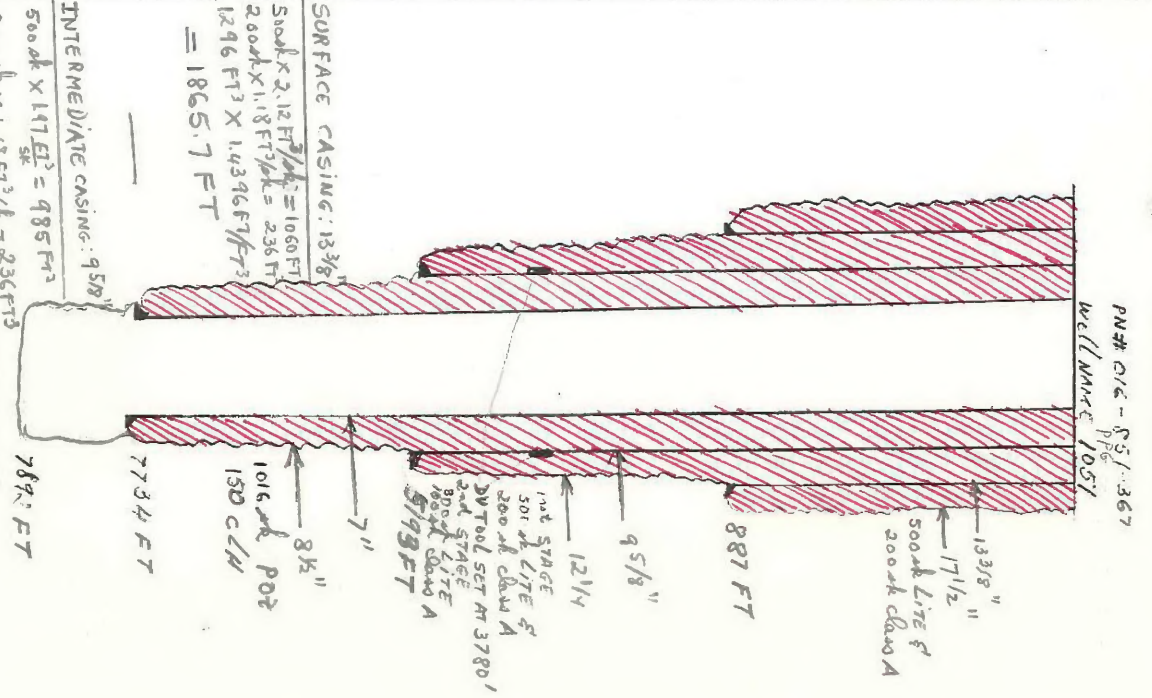
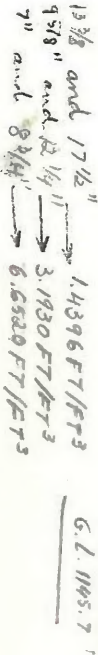



$$\frac{1083 \text{ FT}^3 \times 1.4396 \text{ FT}^3/\text{FT}^3}{\text{INTERMEDIATE CASING}} = 1559 \text{ FT}^3$$
$$\begin{aligned} 1900 \text{ da} \times 1.91 \text{ F}^2/\text{da} &= 3.64 \text{ F}^2 \\ 360 \text{ da} \times 1.18 \text{ F}^3/\text{da} &= 354 \text{ F}^3 \\ 4097 \text{ F}^2 \times 3.1930 \frac{\text{F}}{\text{F}^2} &= 13,081.72 \text{ F} \end{aligned}$$

longest caving: 7"  
 $9500 \times 1.54 \text{ ft}^2 = 14780 \text{ FT}^3$   
 $15000 \times 1.18 \text{ ft}^2 = 17700 \text{ FT}^3$   
 $11500 \times 2.85 \text{ ft}^2 = 32775 \text{ FT}^3$



LONG STRING CASING: 7"  
 $12 \times 1 \frac{1}{2} \times 1.91 \text{ FT} \times 4 = 18.61, 65 \text{ FT}^3$   
 $94.5 \text{ yd} \times 1.91 \text{ FT} \times 4 = 18.61, 65 \text{ FT}^3$   
 $1861.65 \text{ FT}^3 \times 3.1430 \text{ FT} / \text{FT}^3 = 5944.24 \text{ FT}$

$$\begin{aligned} 1010 \text{ ft} \times 1.27 \text{ FT}^3/\text{ft} &= 1282.7 \text{ FT}^3 \\ 235 \text{ ft} \times 1.18 \text{ FT}^3/\text{ft} &= 277.3 \text{ FT}^3 \\ 1560 \text{ FT}^3 \times 7.8859 \text{ FT} &= 12,302 \text{ FT}^4 \end{aligned}$$

$$\begin{aligned} 200 \text{ ft} \times 1.10 \text{ ft}^2/\text{ft} &= 389 \text{ ft} \\ 1.221 \text{ FT}^2 \times 3.1930 \text{ FT}/\text{FT}^3 &= 3.898 .55 \text{ FT} \\ 800 \text{ ft} \times 1.97 \text{ FT}^2/\text{ft} &= 1576 \text{ FT}^3 \\ 1000 \text{ ft} \times 1.18 \text{ FT}^2/\text{ft} &= 118 \text{ FT}^3 \\ 1.94 \text{ FT}^3 \times 3.1930 \text{ FT}/\text{FT}^3 &= 5408.94 \text{ FT} \end{aligned}$$

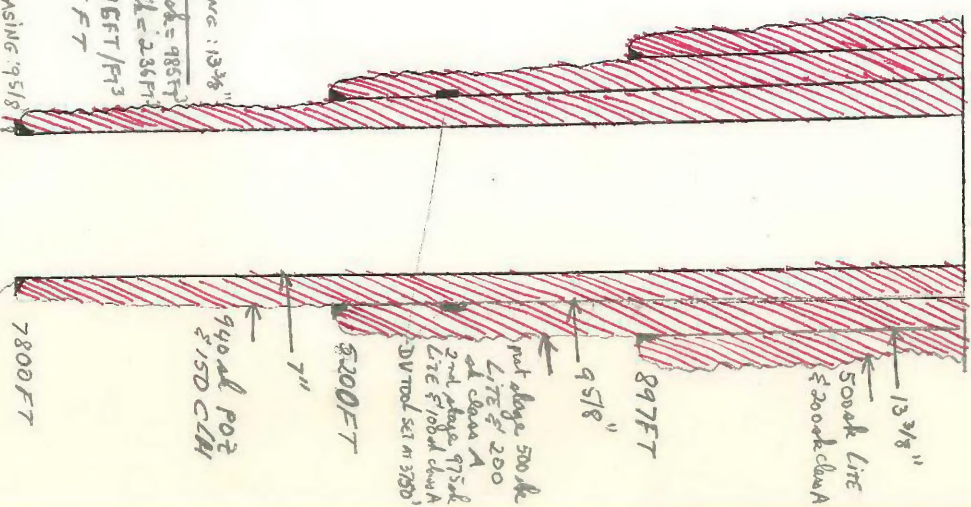
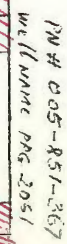
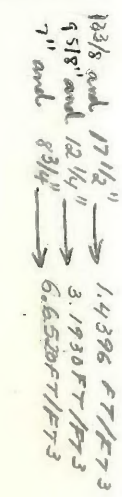
Lengthening casing: 7"

$1016 \text{ dk} \times 1.27 \text{ FT}^3/\text{dk} = 1290.32 \text{ FT}^3$

$150 \text{ dk} \times 1.18 \text{ FT}^3/\text{dk} = 177 \text{ FT}^3$

$1467.32 \text{ FT}^3 \times 6.6500 \text{ FT}/\text{FT}^3 = 9,760.61 \text{ FT}$





940 AL 705  
2150 C/LH

10

7800F7

8066 F7

1

3,561.76 ft

4

5,517.78 FT

LONGSTRING CASING: 7"

$$940 \times 1.32 \text{ FT}^3/\text{hr}$$

2 332.8 FT<sup>3</sup> X 6.6



ATTACHMENT D

MAPS AND CROSS SECTIONS OF USDW's

Reference: SOLUTION MINING PERMIT APPLICATION  
U. S. POTASH SOLUTION MINING TEST FACILITY  
Osceola County, Michigan  
Volume I, Attachments A-D, for  
PPG Industries, Inc., Pittsburgh, Pennsylvania, by  
Fenix & Scisson, Inc., Tulsa, Oklahoma.  
Job #435, January, 1985  
Permit No. MIA-133-3G-0001

EPA Checklist Items:

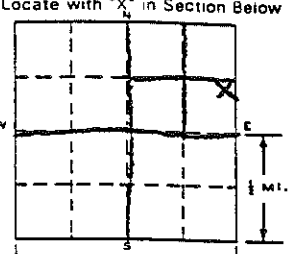
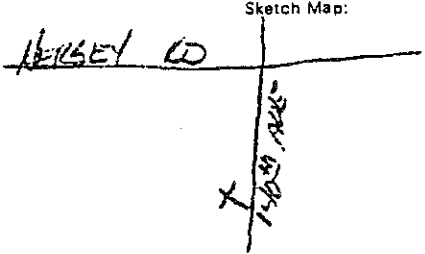
- D. 1. A piezometric map of the water table
- D. 2. Maps and cross-sections of USDW's

The 1985 UIC Application referenced above contains all required information pertaining to checklist items D.1. and D.2.

Individual records have been attached for all new potable water wells drilled in the proposed permit area since the January, 1985 UIC application.

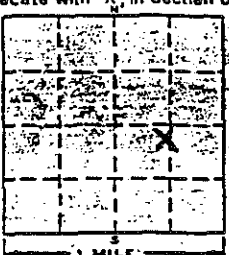
## WATER WELL AND PUMP RECORD

PERMIT NUMBER.  

<b>1 LOCATION OF WELL</b>					
County <b>OSCEOLA</b>	Township Name <b>HERSEY</b>	Fraction <b>NE 1/4 SE 1/4 NE 1/4</b>	Section Number <b>27</b>	Town Number <b>17 N/2</b>	Range Number <b>9</b>
Distance And Direction From Road Intersection <b>1/4 MILE SOUTH OF HERSEY RD. ON 140th AVE. - WEST SIDE OF 140th AVE.</b>					
Street Address & City of Well Location <b>Address Same As Well Location? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No</b>					
Locate with "X" in Section Below		Sketch Map:			
					
<b>2 FORMATION DESCRIPTION</b>		THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM		
<b>SAND</b>		<b>0</b>	<b>38</b>		
<b>COARSE GRAVEL</b>		<b>38</b>	<b>40</b>		
<b>SAND</b>		<b>40</b>	<b>70</b>		
<b>RED CLAY</b>		<b>70</b>	<b>71</b>		
<b>CLAY &amp; SAND</b>		<b>71</b>	<b>87</b>		
<b>FINE SAND</b>		<b>87</b>	<b>95</b>		
<b>3 OWNER OF WELL:</b> <b>MARTIN DAILEY</b> Address <b>140th AVE HERSEY</b> Address Same As Well Location? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No					
<b>4 WELL DEPTH:</b> <b>95</b> FT. Date Completed <b>7-14-89</b> <input checked="" type="checkbox"/> New Well <input type="checkbox"/> Replacement Well					
<b>5</b> <input type="checkbox"/> Cable tool <input type="checkbox"/> Rotary <input type="checkbox"/> Driven <input type="checkbox"/> Dug <input type="checkbox"/> Hollow rod <input type="checkbox"/> Auger <input checked="" type="checkbox"/> Jetted <input type="checkbox"/>					
<b>6 USE:</b> <input checked="" type="checkbox"/> Domestic <input type="checkbox"/> Type I Public <input type="checkbox"/> Type III Public <input type="checkbox"/> Irrigation <input type="checkbox"/> Type IIa Public <input type="checkbox"/> Heat pump <input type="checkbox"/> Test Well <input type="checkbox"/> Type IIb Public <input type="checkbox"/>					
<b>7 CASING:</b> <input checked="" type="checkbox"/> Steel <input type="checkbox"/> Threaded <input type="checkbox"/> Welded Height: Above/Below Surface <b>1</b> ft. <input type="checkbox"/> Plastic <input type="checkbox"/> Diameter <b>2</b> in. to <b>20</b> ft. depth <input type="checkbox"/> Weight <b>375</b> lbs./ft. <input type="checkbox"/> 1 1/4 in. to <b>95</b> ft. depth Grouted Drill Hole Diameter <input type="checkbox"/> Drive Shoe <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> in. to <input type="checkbox"/> ft. depth <input type="checkbox"/> in. to <input type="checkbox"/> ft. depth					
<b>8 SCREEN:</b> <input type="checkbox"/> Not installed Type <b>BEARS</b> Diameter <b>1 1/4"</b> Slot/Gauze <b>#90</b> Length <b>48"</b> Set between <b>90</b> ft. and <b>95</b> ft. FITTINGS: <input type="checkbox"/> K-Packer <input type="checkbox"/> Lead Packer <input checked="" type="checkbox"/> Greener Check <input checked="" type="checkbox"/> Blank above screen <b>1</b> ft. Other <input type="checkbox"/>					
<b>9 STATIC WATER LEVEL:</b> <b>54</b> ft. below land surface <input type="checkbox"/> Flow					
<b>10 PUMPING LEVEL:</b> below land surface <b>54</b> ft. after <b>1</b> hrs. pumping at <b>10</b> G.P.M. ft. after <input type="checkbox"/> hrs. pumping at <input type="checkbox"/> G.P.M.					
<b>11 WELL HEAD COMPLETION:</b> <input checked="" type="checkbox"/> Well adapter <input type="checkbox"/> 12" above grade <input type="checkbox"/> Basement offset <input type="checkbox"/> Approved pit					
<b>12 WELL GROUTED?</b> <input type="checkbox"/> No <input type="checkbox"/> Yes From <input type="checkbox"/> to <input type="checkbox"/> <input type="checkbox"/> Neat cement <input type="checkbox"/> Bentonite <input type="checkbox"/> Other <input type="checkbox"/> No. of bags of cement <input type="checkbox"/> Additives <input type="checkbox"/>					
<b>13 Nearest source of possible contamination:</b> <b>SEPTIC FIELD</b> Distance <b>50</b> ft. Direction <b>W</b> Well disinfected upon completion? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Was old well plugged? <input type="checkbox"/> Yes <input type="checkbox"/> No					
<b>14 PUMP:</b> <input type="checkbox"/> Not installed <input type="checkbox"/> Pump installation Only Manufacturer's name <b>AW</b> Model number <b>AWJOT</b> HP <b>3/4</b> Volts <b>110</b> Length of Drop Pipe <b>80</b> ft. capacity <b>10</b> G.P.M. TYPE: <input type="checkbox"/> Submersible <input checked="" type="checkbox"/> Jet PRESSURE TANK: Manufacturer's name <b>NA</b> Model number <input type="checkbox"/> Capacity <input type="checkbox"/> Gallon					
<b>15. Remarks, elevation, source of data, etc.</b>					
<b>16. WATER WELL CONTRACTOR'S CERTIFICATION:</b> This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief. <b>Peterson Well Drilling</b> 1801 REGISTERED BUSINESS NAME <b>R-3 Corp 188 Kuhl City, MI</b> REGISTRATION NO. <b>1</b> Address <b>188 Kuhl City, MI</b> Signed <b>Robert C. Peterson</b> Date <b>7-14-89</b> AUTHORIZED REPRESENTATIVE					

## WATER WELL AND PUMP RECORD

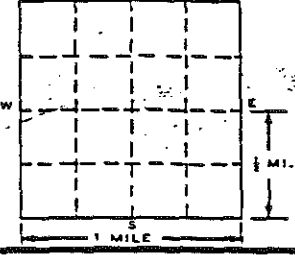
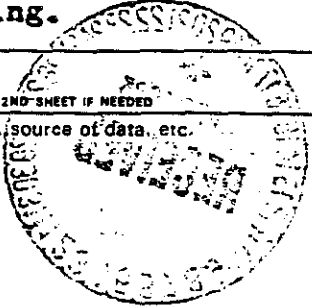
PERMIT NUMBER

1 LOCATION OF WELL		3 OWNER OF WELL	
County <u>OSCEOLA</u>	Township Name <u>Hersey</u>	Fraction <u>NE 1/4 NW 1/4</u>	Section Number <u>23</u> Township Number <u>17N</u> Range Number <u>9E</u>
Distance And Direction From Road Intersection <u>1/4 MI. E of 135th and Hersey Rd.</u> <u>W 31 Side of Rd.</u>		Address <u>2381 W. Hersey Rd.</u> <u>Hersey MI</u>	
Street Address & City of Well Location		Address Same As Well Location? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	
Locate with "X" in Section Below		4 WELL DEPTH: Date Completed <u>6/3/91</u> <input checked="" type="checkbox"/> New Well <input type="checkbox"/> Replacement Well	
Sketch Map: 		5 <input type="checkbox"/> Cable tool <input type="checkbox"/> Rotary <input checked="" type="checkbox"/> Driven <input type="checkbox"/> Dug <input type="checkbox"/> Hollow rod <input type="checkbox"/> Auger <input checked="" type="checkbox"/> Jetted <input type="checkbox"/>	
2 FORMATION DESCRIPTION		6 USE: <input checked="" type="checkbox"/> Domestic <input type="checkbox"/> Type I Public <input type="checkbox"/> Type II Public <input type="checkbox"/> Irrigation <input type="checkbox"/> Type IIA Public <input type="checkbox"/> Heat pump <input type="checkbox"/> Test Well <input type="checkbox"/> Type IIB Public <input type="checkbox"/>	
THICKNESS OF STRATUM		7 CASING: Diameter <input checked="" type="checkbox"/> Steel <input type="checkbox"/> Threaded <input type="checkbox"/> Plastic <input type="checkbox"/> Welded	
DEPTH TO BOTTOM OF STRATUM		Height: Above/Below Surface <u>1</u> ft. Weight <u>225</u> lbs./ft.	
<u>sand</u>	<u>7'</u>	<u>2</u> in. to <u>27</u> ft. depth	
<u>clay</u>	<u>20'</u>	<u>1/4</u> in. to <u>31</u> ft. depth	
<u>sand</u>	<u>4'</u>	Grouted Drill Hole Diameter <u>2</u> in. to <u>31</u> ft. depth	
		Drive Shafts <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	
		8 SCREEN: <input type="checkbox"/> Not Installed	
		Type <u>Open</u> Diameter <u>1 1/2</u> in.	
		Slot/Gauge <u>20</u> Length <u>4</u> ft.	
		Set between <u>27</u> ft. and <u>31</u> ft.	
		FITTINGS: <input checked="" type="checkbox"/> K-Packer <input type="checkbox"/> Lead Packer <input checked="" type="checkbox"/> Brainer Check	
		<input checked="" type="checkbox"/> Blank above screen <u>2</u> ft. Other _____	
		9 STATIC WATER LEVEL: <u>7</u> ft. below land surface <input type="checkbox"/> Flow	
		10 PUMPING LEVEL: below land surface	
		<u>7</u> ft. after <u>1</u> hrs. pumping at <u>10</u> G.P.M.	
		<u>      </u> ft. after <u>      </u> hrs. pumping at <u>      </u> G.P.M.	
		11 WELL HEAD COMPLETION: <input checked="" type="checkbox"/> Pitless adapter <input type="checkbox"/> 12" above grade	
		<input type="checkbox"/> Basement offset <input type="checkbox"/> Approved pit	
		12 WELL GROUTED? <input type="checkbox"/> No <input checked="" type="checkbox"/> Yes From _____ to _____ ft.	
		<input type="checkbox"/> Neat cement <input type="checkbox"/> Bentonite <input type="checkbox"/> Other <u>CEMENT</u>	
		No. of bags of cement _____ Additives _____	
		13 Nearest source of possible contamination	
		Type <u>Septic</u> Distance <u>50</u> ft. Direction <u>W</u>	
		Well disinfected upon completion? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	
		Was old well plugged? <input type="checkbox"/> Yes <input type="checkbox"/> No	
		14 PUMP: <input type="checkbox"/> Not installed <input type="checkbox"/> Pump installation only	
		Manufacturer's name <u>FIW</u>	
		Model number <u>CP205</u> HP <u>1/2</u> Volts <u>110</u>	
		Length of Drop Pipe <u>21</u> ft. capacity <u>10</u> G.P.M.	
		TYPE: <input type="checkbox"/> Submersible <input checked="" type="checkbox"/> Jet	
		PRESSURE TANK:	
		Manufacturer's name <u>CON-AIR</u>	
		Model number <u>427</u> Capacity <u>6</u> Gallons	
15. Remarks, elevation, source of data, etc.		16. WATER WELL CONTRACTOR'S CERTIFICATION:	
		This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.	
17. Rig Operator's Name:		REGISTERED BUSINESS NAME <u>S&amp;S water wells</u> REGISTRATION NO. <u>17417</u>	
		Address <u>9822 McCalla Rd.</u> <u>Paris</u>	
		Signed <u>Arthur Johnston</u> Date <u>6/3/91</u>	
		AUTHORIZED REPRESENTATIVE	

WATER WELL AND PUMP RECORD

PART 127 ACT 368, P.A. 1978

PERMIT NUMBER

1 LOCATION OF WELL		
County <b>Osceola</b>	Township Name <b>Hersey</b>	Fraction <b>1/4 NW 1/4 SW 1/4</b>
		Section Number <b>26</b>
		Town Number <b>17</b>
		Range Number <b>9</b>
Distance And Direction From Road Intersection <b>Well Number P.P.G. Thomas 85-01 Water Supply</b>		
Street Address & City of Well Location		
Locate with "X" in Section Below 		
2 FORMATION DESCRIPTION		
	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
<b>Brown sand - gravel - clay</b>	<b>5</b>	<b>5</b>
<b>Brown sand - gravel</b>	<b>95</b>	<b>100</b>
<b>Gray silty clay - brown sand</b>	<b>15</b>	<b>115</b>
<b>Gray silty - sandy clay</b>	<b>40</b>	<b>155</b>
<b>Gray sand</b>	<b>20</b>	<b>175</b>
<b>Gray silty sandy clay</b>	<b>10</b>	<b>185</b>
<b>Gray silty clay - some sand</b>	<b>45</b>	<b>230</b>
<b>Gray sandy &amp; silty clay</b>	<b>15</b>	<b>245</b>
<b>Gray sand</b>		<b>295</b>
<b>Pitless Adaptor</b>		
<b>Baker Monitor</b>		
<b>6" with 5 ft. Bury</b>		
<b>Swage 6x4 nipple on bottom to 4" casing.</b>		
15. Remarks, elevation, source of data, etc.		
USE A 2ND SHEET IF NEEDED		
		
3 OWNER OF WELL: <b>P.P.G.</b> Address <b>2258 Enterprise Dr. Mt. Pleasant, MI. 48858</b> Address Same As Well Location? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		
4 WELL DEPTH: (completed) <b>285</b> ft. Date of Completion <b>1-8-85</b>		
5 <input type="checkbox"/> Cable tool <input checked="" type="checkbox"/> Rotary <input type="checkbox"/> Driven <input type="checkbox"/> Dug <input type="checkbox"/> Hollow rod <input type="checkbox"/> Auger <input type="checkbox"/> Jetted		
6 USE: <input checked="" type="checkbox"/> Domestic <input type="checkbox"/> Type I Public <input type="checkbox"/> Type III Public <input type="checkbox"/> Irrigation <input type="checkbox"/> Type IIa Public <input type="checkbox"/> Heat pump <input type="checkbox"/> Test Well <input type="checkbox"/> Type IIb Public		
7 CASING: Diameter <input checked="" type="checkbox"/> Steel <input type="checkbox"/> Threaded <input type="checkbox"/> Plastic <input type="checkbox"/> Welded Height: Above/Below Surface <b>1</b> ft. Weight <b>11</b> lbs./ft. Drive Shoe <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		
8 SCREEN: <input type="checkbox"/> Not installed Type <b>Stainless w/w</b> Diameter <b>3 1/2</b> OD Slot/Groove <b>10</b> Length <b>8</b> ft. Set between <b>277</b> ft. and <b>285</b> ft. FITTINGS: <input checked="" type="checkbox"/> K-Packer <input type="checkbox"/> Lead Packer <input type="checkbox"/> Bremer Check <input type="checkbox"/> Blank above screen <b>3</b> ft. Other		
9 STATIC WATER LEVEL: <b>158</b> ft. below land surface <input type="checkbox"/> Flow		
10 PUMPING LEVEL: below land surface <b>No test conducted</b> ft. after _____ hrs. pumping at _____ G.P.M. ft. after _____ hrs. pumping at _____ G.P.M.		
11 WELL HEAD COMPLETION: <input checked="" type="checkbox"/> Pitless adaptor <input type="checkbox"/> 12" above grade <input type="checkbox"/> Basement offset <input type="checkbox"/> Approved pit		
12 WELL GROUTED? <input type="checkbox"/> No <input checked="" type="checkbox"/> Yes From <b>276.5</b> to <b>0</b> ft. <input checked="" type="checkbox"/> Neat cement <input type="checkbox"/> Bentonite <input type="checkbox"/> Other No. of bags of cement <b>29</b> Admixtures <b>3</b> Ft.		
13 Nearest source of possible contamination Type <b>None near</b> Distance _____ ft. Direction _____ Well disinfected upon completion? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		
14 PUMP: <input type="checkbox"/> Not installed <input type="checkbox"/> Pump installation Only Manufacturer's name <b>Red Jacket</b> Model no <b>500T1 13FC</b> HP <b>5</b> Volts <b>230</b> Length of Drop Pipe <b>231</b> ft. capacity <b>20</b> G.P.M. TYPE: <input checked="" type="checkbox"/> Submersible <input type="checkbox"/> Jet PRESSURE TANK: Manufacturer's name <b>251 HG Xtrol</b> Model number _____ Capacity _____ Gallons		
16. WATER WELL CONTRACTOR'S CERTIFICATION: This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief. <b>Brown Drilling Co., Inc.</b> <b>26</b> REGISTERED BUSINESS NAME REGISTRATION NO. Address <b>Howell</b> Signed <b>James R. Brown</b> Date <b>2-1-85</b> AUTHORIZED REPRESENTATIVE		

## WATER WELL AND PUMP RECORD

67170926004

48767000

PERMIT NUMBER

1 LOCATION OF WELL		3 OWNER OF WELL:	
County <u>Oscoda</u>	Township Name <u>Holly</u>	Fraction <u>SE 1/4 NE 1/4 SW 1/4</u>	Section Number <u>26</u>
Distance and Direction From Road Intersection <u>6 mi So of 2nd Rd &amp; 135<sup>th</sup></u> <u>45' on West side of 135<sup>th</sup></u>		Town Number <u>17 N18</u>	
Street Address & City of Well Location		Range Number <u>9</u>	
Locate with "X" in Section Below		Address <u>P.O. Box 333</u> <u>1126 So. 140<sup>th</sup> St. Holly MI 49639</u>	
Sketch Map: 		Address Same As Well Location? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	
2 FORMATION DESCRIPTION		4 WELL DEPTH: (completed) <u>317</u> ft.	
	THICKNESS OF STRATUM	Date of Completion	
<u>Gray Clay</u>	<u>60</u>	<u>5/17</u>	
<u>Sand</u>	<u>82</u>	5 <input type="checkbox"/> Cable tool <input checked="" type="checkbox"/> Rotary <input type="checkbox"/> Driven <input type="checkbox"/> Auger	
<u>Gray Clay</u>	<u>53</u>	<input type="checkbox"/> Hollow rod <input type="checkbox"/> Jetted <input type="checkbox"/> Oug	
<u>Sd &amp; Clay mixed</u>	<u>25</u>	6 USE: <input type="checkbox"/> Domestic <input type="checkbox"/> Type I Public <input type="checkbox"/> Type III Public	
<u>Gray Clay</u>	<u>40</u>	<input type="checkbox"/> Irrigation <input type="checkbox"/> Type IIa Public <input type="checkbox"/> Heat pump	
<u>Sd &amp; Clay mixed</u>	<u>30</u>	<input type="checkbox"/> Test Well <input type="checkbox"/> Type IIb Public <input type="checkbox"/>	
<u>Med to coarse Sd</u>	<u>27</u>	7 CASING: <input checked="" type="checkbox"/> Steel <input checked="" type="checkbox"/> Threaded <input type="checkbox"/> Plastic <input type="checkbox"/> Welded	
		Diameter <u>4</u> in. to <u>300</u> ft. depth	
		Grouted Drill Hole Diameter <u>7</u> in. to <u>300</u> ft. depth	
		Height: Above/Below W Surface <u>2</u> ft.	
		Weight <u>11</u> lbs./ft.	
		Drive Shoe <input type="checkbox"/> Yes <input type="checkbox"/> No	
		8 SCREEN: <input type="checkbox"/> Net installed	
		Type <u>Johnson S5</u> Diameter <u>3</u>	
		Slot/Groove <u>10</u> Length <u>15'</u>	
		Set between <u>302</u> ft. and <u>317</u> ft.	
		FITTINGS: <input checked="" type="checkbox"/> K-Packer <input type="checkbox"/> Leao Packer <input type="checkbox"/> Bremer Check	
		<input type="checkbox"/> Blank above screen <u>ft</u> Other <u></u>	
		9 STATIC WATER LEVEL: <u>196</u> ft. below land surface <input type="checkbox"/> Flow	
		10 PUMPING LEVEL: below land surface	
		<u>ft.</u> after <u>hrs.</u> pumping at <u>G.P.M.</u>	
		<u>ft.</u> after <u>hrs.</u> pumping at <u>G.P.M.</u>	
		11 WELL HEAD COMPLETION: <input checked="" type="checkbox"/> Pileless adapter <input type="checkbox"/> 12" above grade	
		<input type="checkbox"/> Basement offset <input type="checkbox"/> Approved pit	
		12 WELL GROUTED? <input type="checkbox"/> No <input checked="" type="checkbox"/> Yes From <u>0</u> to <u>300</u>	
		<input checked="" type="checkbox"/> Neat cement <input type="checkbox"/> Bentonite <input type="checkbox"/> Other <u></u>	
		No. of bags of cement <u>26</u> Additives <u></u>	
		13 Nearest source of possible contamination	
		Type <u>Septic</u> Distance <u>85'</u> Direction <u>West</u>	
		Well disinfected upon completion? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	
		14 PUMP: <input type="checkbox"/> Not installed <input type="checkbox"/> Pump installation only	
		Manufacturer's name <u>Fluor / Well</u>	
		Model number <u>FF55</u> HP <u>5</u> Volts <u>230</u>	
		Length of Drop Pipe <u>277</u> ft. capacity <u>35</u> G.P.M.	
		TYPE: <input checked="" type="checkbox"/> Submersible <input type="checkbox"/> Jet	
		PRESSURE TANK:	
		Manufacturer's name <u></u>	
		Model number <u></u> Capacity <u></u> Gallons	
15. Remarks, elevation, source of data, etc.		16. WATER WELL CONTRACTOR'S CERTIFICATION:	
		This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.	
		<u>L &amp; R Well Drilling Inc</u> <u>1770</u>	
		REGISTERED BUSINESS NAME <u>KR #1</u> REGISTRATION NO. <u>4875</u>	
		Address <u>1500 78th</u>	
		Signed <u>X. J. J. J.</u> Date <u>4-12-81</u>	
		AUTHORIZED REPRESENTATIVE	

**Authority:** Act 388 PA 1978  
**Completion:** Required  
**Penalty:** Conviction of a violation of any provision is a



## WATER WELL AND PUMP RECORD

PERMIT NUMBER

1 LOCATION OF WELL		Township Name		Fraction	Section Number	Town Number	Range Number
JSCOLA		Horse		NW 1/4	35	17 N	9 W
Distance And Direction From Road Intersection				OWNER OF WELL			
WELL LOCATED SOUTH OF INTERSECTION 300 FT.				ROCKNEY L. WINN			
Street Address & City of Well Location				Address			
Locate with "X" in Section Below				6425 W. EARNES EATON RAPIDS MI. 48827			
Sketch Map:				Address Same As Well Location? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No			
				4 WELL DEPTH: Date Completed			
				145 FT. 7/14/90			
				<input type="checkbox"/> Cable tool <input type="checkbox"/> Rotary <input type="checkbox"/> Driven <input type="checkbox"/> Dug <input type="checkbox"/> Hollow rod <input type="checkbox"/> Auger <input type="checkbox"/> Jatted			
				6 USE: <input type="checkbox"/> Domestic <input type="checkbox"/> Type I Public <input type="checkbox"/> Type III Public <input type="checkbox"/> Irrigation <input type="checkbox"/> Type IIa Public <input type="checkbox"/> Heat pump <input type="checkbox"/> Test Well <input type="checkbox"/> Type IIb Public			
				7 CASING: Diameter <input type="checkbox"/> Steel <input type="checkbox"/> Dressed <input type="checkbox"/> Plastic <input type="checkbox"/> Welded			
				Height: Above/Below Surface 1 ft.			
				Weight 3.75 lbs./ft.			
				Drive Shoe <input type="checkbox"/> Yes <input type="checkbox"/> No			
2 FORMATION DESCRIPTION				THICKNESS OF STRATUM			
CLAY RED				15' 15'			
SAND YELLOW				31' 46'			
SAND + CLAY MIXED				90' 136'			
CLAY GRAY				4' 140'			
SAND YELLOW				5' 145'			
				8 SCREEN: <input type="checkbox"/> Not installed			
				Type C. ANNAK Diameter 1 1/4"			
				Slot/Gauze 8 Length 42"			
				Set between 140 ft. and 145 ft.			
				FITTINGS: <input type="checkbox"/> K-Packer <input type="checkbox"/> Lead Packer <input checked="" type="checkbox"/> Rammer Check			
				<input checked="" type="checkbox"/> Blank above screen 4 ft. Other			
				9 STATIC WATER LEVEL: 115 ft. below land surface <input type="checkbox"/> Flow			
				10 PUMPING LEVEL: below land surface			
				135 ft. after 1 hrs. pumping at 12 G.P.M.			
				ft. after hrs. pumping at G.P.M.			
				11 WELL HEAD COMPLETION: <input type="checkbox"/> Pitless adapter <input checked="" type="checkbox"/> 12" above grade			
				<input type="checkbox"/> Basement offset <input type="checkbox"/> Approved pit			
				12 WELL GROUTED? <input type="checkbox"/> No <input checked="" type="checkbox"/> Yes From 0 to 25 ft.			
				<input type="checkbox"/> Neat cement <input checked="" type="checkbox"/> Bentonite <input type="checkbox"/> Other			
				No. of bags of cement Additives			
				13 Nearest source of possible contamination			
				Type SEPTIC Distance 61 ft. Direction EAST			
				Well disinfected upon completion? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No			
				Was old well plugged? <input type="checkbox"/> Yes <input type="checkbox"/> No			
				14 PUMP: <input type="checkbox"/> Not Installed <input type="checkbox"/> Pump Installation Only			
				Manufacturer's name FLINT + WALLING			
				Model number HP 2 Volts 230			
				Length of Drop Pipe 126 ft. capacity 6 G.P.M.			
				TYPE: <input type="checkbox"/> Submersible <input checked="" type="checkbox"/> Jet			
				PRESSURE TANK: Manufacturer's name			
				Model number Capacity Gallons			

15. Remarks, elevation, source of data, etc.

16. WATER WELL CONTRACTOR'S CERTIFICATION:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

17. Rig Operator's Name:

Robert Sorensen Jr.

REGISTERED BUSINESS NAME

REGISTRATION NO.

Address

Signed

AUTHORIZED REPRESENTATIVE

Date

Authority:

Completion:

Penalty:

Act 366 PA 1978

Required

Conviction of a violation of any provision is a

ATTACHMENT E

NAME AND DEPTH OF USDW'S (CLASS II)

This attachment does not apply to Class III wells.

#### 4. Formation Data in Area of Review

Well Name/ Number	Base of Glacial Drift (TVD)	Thickness A-1 Carbonate	Top A-1 Salt (TVD)	Base A-1 Salt (TVD)
Lutz 1-34	653 (est)	<u>57</u>	<u>7479</u> <i>Top</i>	7854
Paine 1-26	595 (est)	56	7496	7827
Thomas 2-26 (1011)	625	53	7490	7808
Thomas 3-26 (1012)	620	54	7490	7808
Paine 1-35	<u>672</u> (est) ✓	53	7560	7887
Baldino 1-36	640 (est)	51	7558	<u>7896</u> <i>Lower</i>
2031	609	55	7486	7807

*Injection zone → 7479  
→ 7896*

## ATTACHMENT F

### MAPS AND CROSS SECTIONS OF GEOLOGIC STRUCTURE OF AREA

Reference: SOLUTION MINING PERMIT APPLICATION  
U. S. Potash Solution Mining Test Facility  
Osceola County, Michigan  
Volume II, Attachments E-U, for  
PPG Industries, Inc., Pittsburgh, Pennsylvania,  
January, 1985  
Permit No. MIA-133-3G-0001

#### EPA Checklist Items:

- F. 1. Regional geology
  - a. surface geology
  - b. cross-sections
  - c. structural contour map
- F. 2. Local geology
  - (a) two perpendicular cross-sections
  - (b) description of upper and lower confining strata (lithology, permeability, etc.)
  - (c) description of faulting in area
  - (d) depositional, structural and tectonic history of the area
  - (e) structural contour map of marker bed above salt area
  - (f) isopach map of injection zone
- F. 3. Geohydrology - reservoir mechanics of injection zone
  - (a) depth
  - (b) geologic name
  - (c) porosity
  - (d) permeability
  - (e) temperature
  - (f) reservoir pressure

- (g) faulting, fracturing, solution channels
- (h) fracture gradient
- (i) piezometric surface map

The 1985 UIC Application referenced above contains all required information pertaining to the proposed permit area.

ATTACHMENT G

Does not apply to Class III wells.



6. The injection fluids to the solution mining wells will consist of the following:

- low quality solutions from the solution mining operation
- fresh water from water wells and site run-off from rainfall
- recycled solution from the refinery
- boiler blow down fluid
- facility purge and flush water

ATTACHMENT I  
FORMATION TESTING PROGRAM

EPA Checklist Items:

- I. 1. Collection and analysis of formation fluid
- I. 2. Cores and core testing
- I. 3. Injectivity testing
- I. 4. The injection zone is water bearing
  - (a) fluid pressure
  - (b) fracture pressure
  - (c) physical and chemical analysis
- I. 5. The injection zone is not water bearing
  - (a) fracture pressure

The formation does not have any native fluids and is a tight formation. The ore present in the formation is dissolved into the injected fluids rather than forcing fluids into the rock strata. Core samples, when taken, are analyzed for chemical assay only.

The solution mining operation will be conducted at a pressure well below the recommended limit of 0.8 psi per foot of depth. No attempt will be made to fracture the mining zone for the purpose of determining fracture pressure. See also Attachment J.

ATTACHMENT J  
STIMULATION PROGRAM

EPA Checklist Items:

- J. 1. Fracturing
- J. 2. Acidizing
- J. 3. Other

Solution mining of potash ore is accomplished by dissolving the ore into the injected fluid rather than forcing the injected fluid into a rock strata. Therefore, fracturing of the mining zone is not required and will not be done.

## ATTACHMENT L

### CONSTRUCTION PROCEDURES

Two different construction procedures will be used for wells. Wells constructed prior to 1986 have already been completed according to the procedures listed below. Wells that will be constructed in the future (beginning in 1986) will have an improved casing program that is detailed at the end of this section.

#### EPA Checklist Items:

Typical for Wells Constructed Prior to 1986

L-1. 1. Total Depth - 7,825' (est.)

L-1. 2. Type Completion - Cased hole.

L-1. 3. Surface Casing:

- |    |                |   |
|----|----------------|---|
| a. | Size           | 13-3/8"   |
| b. | Type           | K-55, ST&C, 8 Rd. Thread  |
| c. | Weight         | 54.0#/ft.   |
| d. | Setting depth  | 900' (est.)   |
| e. | Centralization | Five bottom joints centralized with a weld-on guide shoe on bottom. |

- NOTE:
- i. 24" conductor pipe driven to a depth of 100'.
  - ii. 17-1/2" hole drilled to a depth of 905' (est.).

L-1. 4. Intermediate Casing:

- |    |                |  |
|----|----------------|--|
| a. | Size           | 9-5/8"   |
| b. | Type           | N-80, LT&C, 8 Rd. Thread   |
| c. | Weight         | 40.0#/ft.  |
| d. | Setting depth  | 5,450' (est.)  |
| e. | Centralization | Eight contralizers on every second joint from bottom with a float shoe on bottom and a float collar at the top of the first joint. |

- NOTE:
- i. 12-1/4" hole drilled to a depth of 5,455' (est.).

L-1. 5. Long String (Production) Casing:

- |    |      |    |
|----|------|----|
| a. | Size | 7" |
|----|------|----|

- b. Type N-80 grade or better, LT&C, 8 Rd Thread
- c. Weight 23#/ft.
- d. Setting depth 7,590' (est.)
- e. Centralization A float collar and centralizer on bottom and a float collar with manual fill one joint up with a centralizer midway between joints and held in place with stop rings.

NOTE: 8-1/2" hole drilled to a depth of 7,825' (est.) and then plugged back to 7,610' (est.) with 50 sacks of HOWCO Lite cement.

L-1. 6. Liner or Other Casing:

N/A

L-1. 7. Logging Program:

- a. Surface Hole: Not logged in open hole or after casing run.

- b. Intermediate Hole:

Open hole - Schlumberger Dual Micro Laterolog from 3,200' to 4,140' (est.).

Schlumberger Litho-Density/Compensated Neutron/GR Log from 100' to 5,455' (est.).

Cased hole - No logs.

- c. Production Hole:

Open hole - Schlumberger Litho-Density/Compensated Neutron/GR Log from 5,455' to 7,825' (est.)

Cased hole - Cement Bond Log and Gamma-Ray Neutron/Casing Collar Location logs run from total depth to surface after drilling out float equipment and cement below casing.

- d. Directional Surveys:

Well directionally drilled; surveyed with magnetic single shot instruments while drilling. Verification surveys taken with gyroscopic multi-shot instruments in cased hole.

L-1. 8. Cementing Data:

a. Surface Casing:

The casing is cemented with 500 sacks of HOWCO Lite and 200 sacks of Class A cement. Cement returns to surface.

b. Intermediate Casing:

The casing is cemented to surface in two stages. The first stage is cemented with 600 sacks of HOWCO Lite and 200 sacks of Class A cement. Cement returns to surface. The DV tool (stage cementing tool) is then closed and the second stage cemented using 800 sacks of HOWCO Lite and 100 sacks of Class A. Cement returns to surface.

c. Long String (Production) Casing:

Casing is cemented with 450 sacks of HOWCO Lite (salt saturated), 450 sacks of HOWCO Poz (18% salt) and 280 sacks of HOWCO Special H. Cement returns to surface.

L-1. 9. Tubing:

- a. Size 2-7/8" or 4-1/2"
- b. Type 2-7/8" is J-55 grade or better, 6.5#/ft., EUE or 4-1/2" is K-55 grade or better, 10.6#/ft., 8 Rd.
- c. Setting depth 7,830' (est.)

L-1. 10. Corrosiveness of Injected Fluids

Injection fluid is water or brine with injection temperatures between 50°F and 180°F. Chemical treatment will be used to maintain corrosion rates less than 10 mils/year on the steel well casing.

EPA Checklist Items:

Typical for Wells Constructed in 1986 or later:

L-2. 1. Total Depth - 7,825' (est.)

L-2. 2. Type Completion - Cased hole.

L-2. 3. Surface Casing (A) - Optional:

- a. Size 18-5/8"



b.	Type	K-55, ST&C, 8 Rd. Thread
c.	Weight	86.0#/ft.
d.	Setting depth	600' (est.)
e.	Centralization	None

NOTE: i. 24" hole drilled to 605' (est.)

ii. This is a remedial string set through aquifer and above potential lost circulation zone.

Surface Casing (B):

a.	Size	13-3/8"
b.	Type	K-55, ST&C, 8 Rd. Thread
c.	Weight	54.0 #/ft
d.	Setting Depth	900' (est.)
e.	Centralization	Bottom 5 joints are strapped across collars

NOTE: i. 17-1/2" hole drilled to 905' (est.)

L-2. 4. Intermediate Casing:

a.	Size	9-5/8"
b.	Type	Mixed N-80 & K-55 LT&C, 8 Rd.
c.	Weight	40.0#/ft.
d.	Setting depth	5,225' (est.)
e.	Centralization	Eight contralizers on every second joint from bottom with a float shoe on bottom and a float collar at the top of the first joint.

NOTE: i. 12-1/4" hole drilled to a depth of 5,230' (est.).

ii. Approximately 500' of N-80 is run at bottom of string with K-55 above it to surface.

L-2. 5. Long String (Production) Casing:

a.	Size	7"
b.	Type	L-80 grade or better, LT&C, 8 Rd Thread
c.	Weight	23-29#/ft. depending upon depth
d.	Setting depth	7,590' (est.)
e.	Centralization	Float shoe on bottom with centralizer midway on first joint and float collar on top. Centralizers on every other joint for approximately 400-500'. Centralizers are held

in place with stop rings.

NOTE: 8-1/2" hole drilled to a depth of 7,825' (est.)  
and then plugged back to 7,610' (est.) with 50  
sacks of HOWCO Lite cement.

L-2. 6. Liner or Other Casing:

N/A

L-2. 7. Logging Program:

a. Surface Hole: Not logged in open hole or after  
casing run.

b. Intermediate Hole:

Open hole - Dual Micro Laterolog from 3,200' to  
4,140' (est.).

Litho-Density/Compensated  
Neutron/GR Log from 100' to 5,230'  
(est.).

Cased hole - No logs.

c. Production Hole:

Open hole - Litho-Density/Compensated  
Neutron/GR Log from 5,230' to  
7,825' (est.)

Cased hole - Cement Bond Log and Gamma-Ray  
Neutron/Casing Collar Location logs  
run from total depth to surface  
after drilling out float equipment  
and cement below casing.

d. Directional Surveys:

Well directionally drilled; surveyed with magnetic  
single shot instruments while drilling.  
Verification surveys, if desired, taken with  
gyroscopic multi-shot instruments in cased hole.

L-2. 8. Cementing Data:

a. Surface Casing(A):

The casing is cemented with 600 sacks of HOWCO  
Lite and 240 sacks of Class A cement. Cement  
returns to surface.

Surface Casing (B):

The casing is cemented with 500 sacks of HOWCO Lite and 200 sacks of Class A cement. Cement returns to surface.

b. Intermediate Casing:

The casing is cemented to surface in two stages. The first stage is cemented with 600 sacks of HOWCO Lite and 200 sacks of Class A cement. Cement returns to surface. The DV tool (stage cementing tool) is then closed and the second stage cemented using 800 sacks of HOWCO Lite and 100 sacks of Class A. Cement returns to surface.

c. Long String (Production) Casing:

Casing is cemented with 450 sacks of HOWCO Lite (salt saturated), 450 sacks of HOWCO Poz (18% salt) and 280 sacks of HOWCO Special H. Cement returns to surface.

L-2. 9. Tubing:

- a. Size 2-7/8" or 4-1/2"
- b. Type 2-7/8" is J-55 grade or better, 6.5#/ft., EUE or 4-1/2" is K-55 grade or better, 10.6#/ft., 8 Rd.
- c. Setting depth 7,830' (est.)

L-2. 10. Corrosiveness of Injected Fluids:

Injection fluid is water or brine with injection temperatures between 50°F and 180°F. Chemical treatment will be used to maintain corrosion rates at less than 10 mils/year on the steel well casing.

ATTACHMENT M  
CONSTRUCTION DETAIL

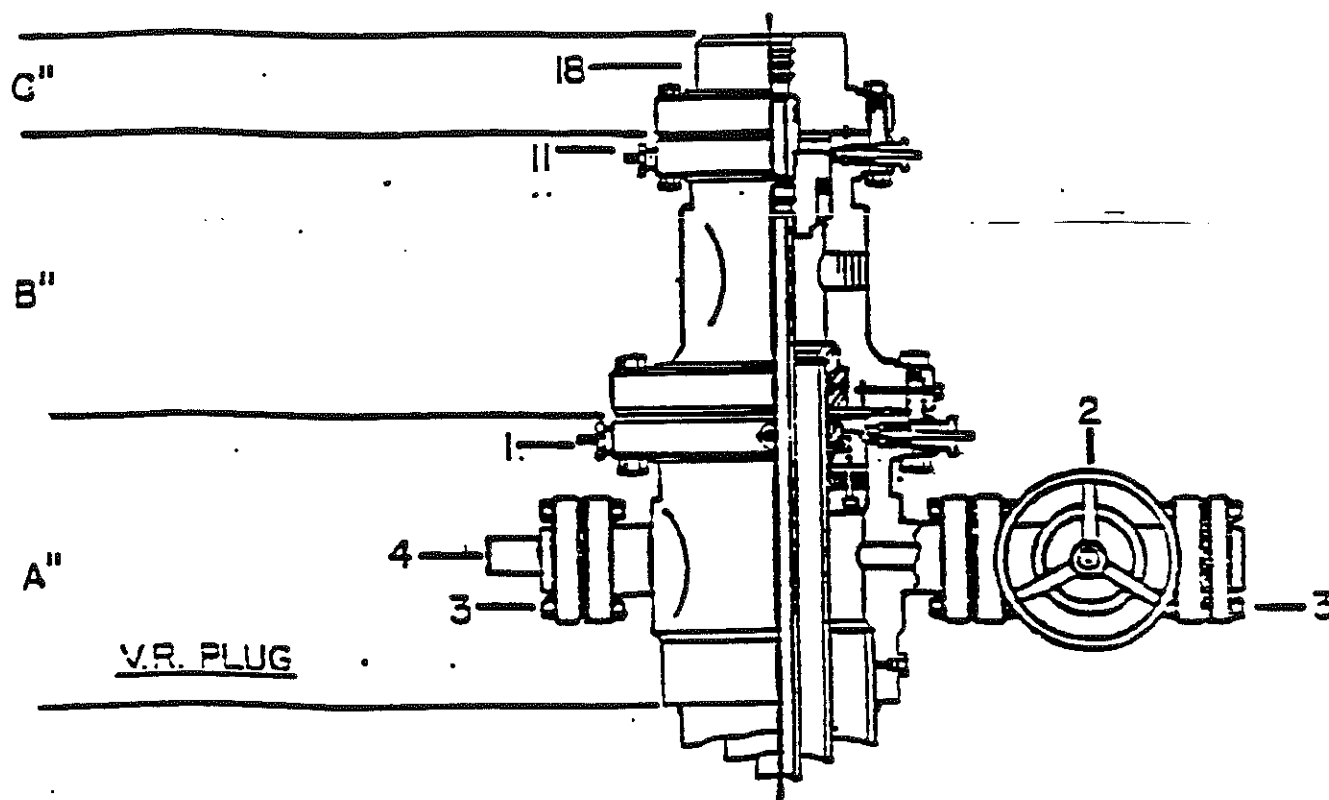
EPA Checklist Items:

- M. 1. Well Construction
- M. 2. Wellhead

The following documents identify the construction details for the wellhead and borehole.

Figure M-1	Wellhead Details
Figure M-2	Parts Listing
Figure M-3	Typical Casing and Cement Program for Wells Constructed Prior to 1986
Figure M-4	Typical Casing and Cementing Program Wells Constructed Beginning 1986

Figure M-1



**FMC**

WELLHEAD EQUIPMENT DIVISION  
HOUSTON

**O.C.F.**

X-4148-REV 5

DATE 5-11-84

FILE NO.



POTASH PRODUCTION  
WELLHEAD DESIGN

84-0140  
X-4148-Rev.5

9-5/8" X 7" X  
2-7/8"

WORKING  
PRESSURE

5000#

TREE NO.

SIZE

ITEM	PART NO.	QUAN.	DESCRIPTION
<u>SECTION A</u>			
1	13-118-613	1	Casing Head, Type C-22-8P, 9-5/8" O.D. Slip-On with Test Port X 11" 5000# WP Flanged Top with Two 2-1/16" 5000# WP Flanged Outlets
1A	25-410-211	1	Plug, Type V.R., 2"
2	90-010-620	1	Valve, O.C.T., Model 20 with "R" Trim, 2-1/16" 5000# WP, Flanged End, Full Port
3	26-015-601	2	Flange, Companion, 2-1/16" 5000# WP X 2" L.P.
4	25-300-030	1	Bull Plug, Type "8", 2" L.P.
5	73-010-024	3	Ring Gasket, API Metal, R-24
6	78-010-235	24	(3 Set) Studs and Nuts, Cad., 7/8" X 6"
TOTAL LIST PRICE SECTION A			
<u>SECTION B</u>			
8	12-080-025	1	Casing Hanger, Type C-22, 10" X 7"
9	73-010-054	1	Ring Gasket, API Metal, R-54
10	78-010-823	12	(1 Set) Studs and Nuts, Cad., 1-7/8" X 13-3/4"





POTASH PRODUCTION  
WELLHEAD DESIGN

84-0140  
X-4148-Rev.5

9-5/8" X 7" X  
2-7/8"

WORKING  
PRESSURE

5000#

TREE NO.		SIZE	PRESSURE	
ITEM	PART NO.	QUAN.	DESCRIPTION	
11	83-360-672	1	Tubing Head, Type TCM-8G, 9" O.D., 11" 5000# WP Flanged Bottom X 7-1/16" 5000# WP Flanged Top with One 4" L.P. Female Outlet and One 2" L.P. Female Outlet	
12	83-165-070	1	Bushing, Packoff and Reducer, Type "PE", 9" X 7" O.D., Complete with Snap Ring	
TOTAL LIST PRICE SECTION B				
SECTION C				
15	82-740-16D	1	Tubing Hanger, Type TC-1A-8P, 6" X 2-7/8" O.D. EUE 8RF Top and Bottom, with "IS" BPVG	
5A	73-043-070	1	Seal-Off Nipple, 2-7/8" O.D. EUE 8RF X 4-7/8" O.D.	
16	73-010-046	1	Ring Gasket, API Metal, R-46	
17	78-01D-635	12	(1 Set) Studs and Nuts, Cad., 1-3/8" X 1D-3/4"	
18	02-020-716	1	Adapter, Type A-2-P, 7-1/16" 5000# WP X 2-7/8" O.D. EUE 8RF with 4.875" I.D. Counterbore for #73-043-070 Seal Sleeve with Test Port (Ref. HOU-5780)	
TOTAL LIST PRICE SECTION C				
TOTAL UNIT PRICE				
SECTION A				
SECTION B				
SECTION C				
TOTAL UNIT PRICE COMPLETE				

# **TYPICAL CASING AND CEMENT PROGRAM FOR WELLS CONSTRUCTED PRIOR TO 1986**

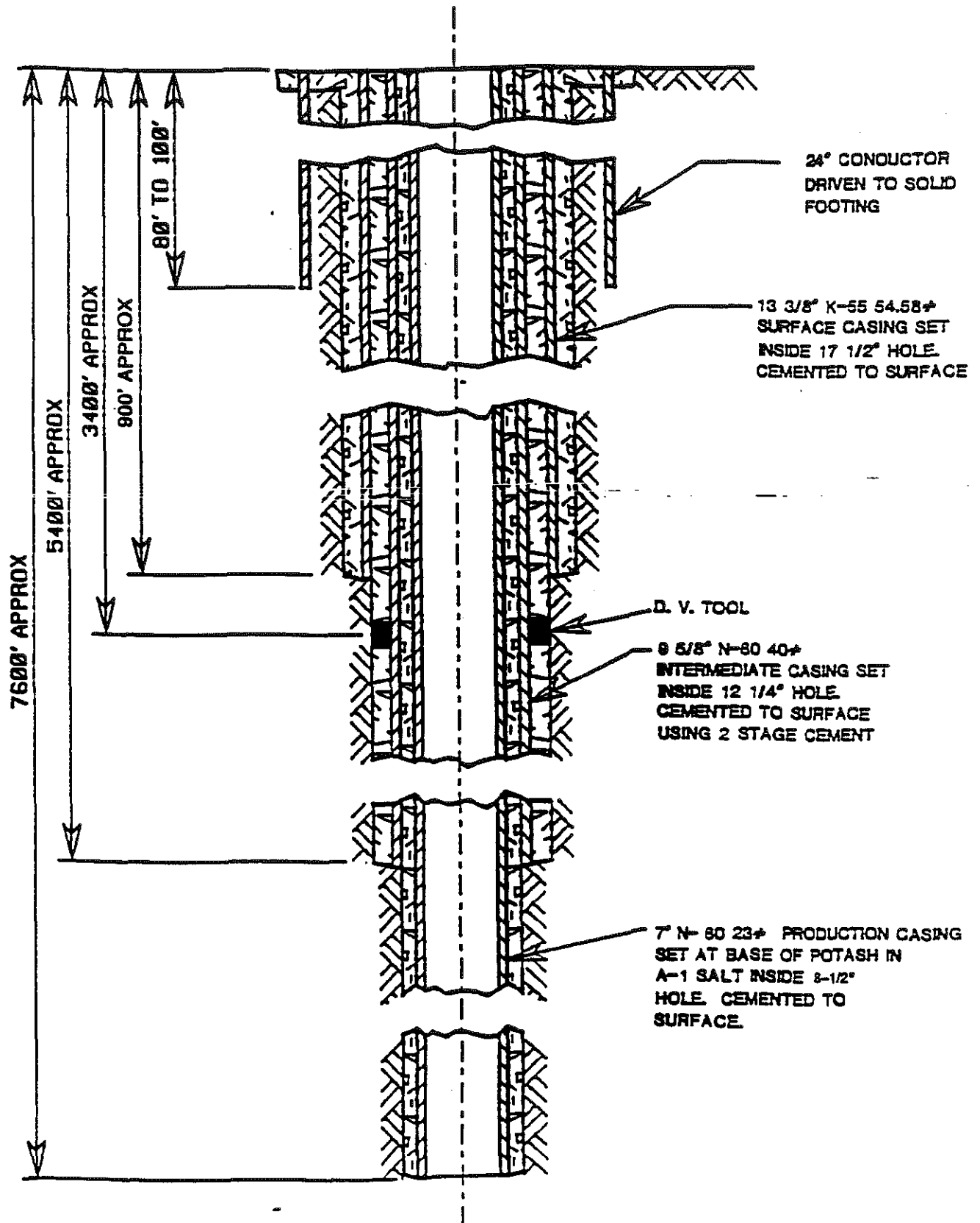


Figure M-3

# **TYPICAL CASING & CEMENTING PROGRAM WELLS CONSTRUCTED BEGINNING 1986**

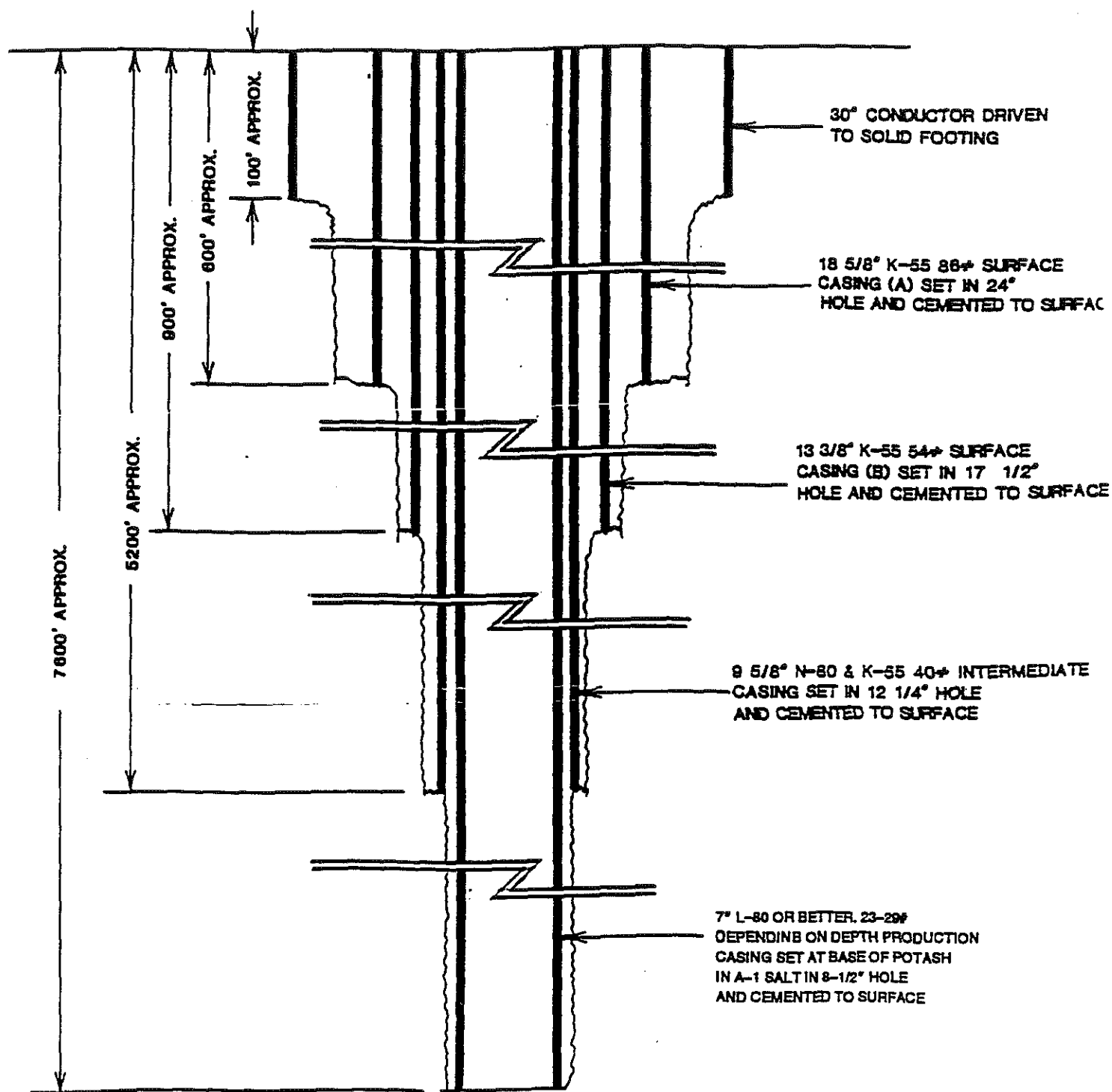


Figure M-4

## ATTACHMENT N

### CHANGES IN INJECTED FLUID

#### EPA Checklist Items:

N. 1. Pressure change:

The pressure of the injected fluid will change only as required to displace the withdrawal brine out of the withdrawal well. The static head imposed by the column of fluid in the withdrawal well will change as the density of the withdrawal fluid changes.

N. 2. Native fluid displacement.

N. 3. Direction of movement of injected fluid formation.

Solution mining of potash ore is accomplished by dissolving the ore into the injected fluid rather than forcing the injected fluid into a rock strata. The solution mining process will be contained in the mined out cavern in the A-1 Evaporite. There will be no movement of fluids either into or out of the cavern except by way of the cased wells. No native fluids are present in the A-1 Evaporite or the confining strata.

## ATTACHMENT 0

### PLANS FOR WELL FAILURE

#### EPA Checklist Items:

No items listed.

Containment facilities are provided at the solution mining wells as an integral part of the minefield cluster design. In the unlikely event that a spill would escape the containment facilities at any cluster site or the associated disposal wells, the following offices would be notified by the supervisor at the Potash Facility:

- a. Michigan DNR 800-292-4706
- b. EPA Region 5 312-353-2000
- c. National Response Center (Oil Spills) 800-424-8802

Appropriate written reports would be filed with DNR pursuant to R 323.1164.

In the case of a spill escaping the containment facilities or a spill from a disposal pipeline, plant personnel will take such action as necessary to confine the spill by using earth moving equipment. A vacuum truck would then be used to recover and transport the spilled fluid to the cluster site for handling. Contaminated dirt will be removed and disposed of in an approved landfill. Bulldozers, backhoes, vacuum trucks and like equipment are readily available in the area.

Well failure can be considered to be a malfunction of the well that has potentially adverse environmental consequences particularly with regard to USDW's. Two failure scenarios need to be examined. First, failure of the surface equipment (wellhead) may occur. Second, the subsurface equipment (vertical tubing goods and cement) may fail. Each failure mode will be discussed separately.

#### Plan for Dealing with Wellhead Failure:

The wellhead is a rugged, heavy duty assemblage of steel fittings, spools and valves. Failure of any sort is most unlikely, but the worst case imaginable would be impact by a high-speed, heavy vehicle. Such an impact might cause the wellhead to be sheared off at or near the ground. A "worst case" condition would result if the wellhead damage occurs when the cavern is at maximum size. With these worst case conditions at the time of failure, a geysor of injection fluid (water or dilute brine) would form over the ruptured wellhead. About 1000 gallons of injection fluid may flow from the injection pump side of the system before the pump trips off with the rest of the fluid coming back up the injection well. The entire volume of fluid in

the injection casing or approximately 13,500 gallons would rapidly be displaced out of the open well. The well would continue to depressurize at lower rates after the initial surge. Based on controlled depressurization of solution mining cavities at Kalium's Saskatchewan facility, it is estimated that the total volume of fluid released under the worst case conditions could be 100,000 gallons.

Fluids falling on the concrete pad surrounding the wellhead will be contained and collected. The sump in the wellhead pad will drain through a pipe to the main sump inside the cluster building. Fluids entering the building sump can be pumped to tanks having a total capacity of 150,000 gallons. From these tanks the fluids can be injected back into the solution mining wells or into disposal wells. A lined containment area surrounding the tank farm will hold another 225,000 gallons.

Corrective action to stop the flow and make repairs would be taken as soon as possible. However, the well would most likely depressurize on its own before a service rig could set a mechanical packer in the open casing.

#### Plan for Dealing with Subsurface Hardware Failure:

The possibility of a failure in the downhole equipment that could contaminate the USDW is so remote that it is nearly inconceivable. The aquifer zone is protected by at least three and in newer wells four, concentric casings all cemented back to surface. The 7" inner casing and the 9-5/8" intermediate casing would both have to fail in order to allow fluids to reach the aquifers.

Minefield injection and return flows will both be monitored by recording flowmeters. Any loss of fluid as evidenced by the difference in the injection and return flowmeters will result in testing to isolate the source of the flow balance discrepancy. Individual injection and/or return casings will be tested for leaks as indicated. Conventional oil field techniques will be used to repair any damaged casing that could allow contamination of the USDW.



ATTACHMENT P  
MONITORING PROGRAM

EPA Checklist Items:

P. 1. Frequent Analysis of Waste

Monthly composite samples of the injection and withdrawal fluids will be chemically analyzed.

P. 2. Recorders for

- a. injection pressure
- b. injection rate and volume
- c. annulus pressure

The injection flowrate and pressure to each well will be continuously monitored. The withdrawal flow from all wells will be combined and monitored. These flows along with the chemical analysis of injection and withdrawal fluids will be used to determine a material balance on each well or cluster of wells.

The annulus between the 7" production casing and the 9-5/8" intermediate casing and the 9-5/8" casing and the 13-3/8" surface casing will be filled with cement for this well design making it meaningless to monitor annulus pressure.

P. 3. Mechanical Integrity Testing

Mechanical integrity testing of the wells will be performed before the wells are put in service. The 7" casing will be pressure tested to 2,000 psig (surface pressure). This is 117% of the maximum operating pressure and 222% of the normal operating pressure when on water injection.

No routine pressure testing of the well will be performed. If the injection and withdrawal flow balance indicates a possible leak in underground equipment, the wells will be pressure tested and repaired as indicated.

P. 4. Monitoring Wells

Ground Water Monitoring

An extensive hydrogeologic investigation was conducted under the supervision of W. A. Meneley in the Cluster No. 1 mining area.

Based on Meneley's regional stratigraphic classification (Figure P-1), Cluster 1 is situated on sand corresponding to Unit

F/1/d, a high-energy glacial outwash deposit consisting of moderately to poorly sorted sand with locally variable gravel and silt concentrations. The uppermost barrier layer intersected at Cluster 1 is Unit F/1/c. This is a regionally continuous layer of clay, silty clay till, and silt deposited under stagnant ice and glaciolacustrine conditions and representing a significant barrier to downward migration of fluids. The top of Unit F/1/c is commonly intersected at depths of 95-105 feet below ground level at Cluster 1.

A water table exists at roughly 50-55 feet below ground level. Groundwater flow direction has consistently been determined to be in a west to northwesterly direction, toward Polick Creek, which lies between 1/4 and 1/2 mile to the west. Polick Creek flows north before joining the Muskegon River, about 1.5 miles away.

A ground water quality monitoring program was established at Cluster 1 based on the above information. Monitor wells were drilled to the top of the first barrier layer (Unit F/1/c) in the downgradient direction from the solution mining wells. Figure P-2 shows the location of the monitor wells installed at Cluster No. 1. Background water quality samples were collected and analyzed prior to commencing solution mining operations.

Ground water samples from the monitor wells have been obtained at least quarterly and field analyzed for specific conductivity and chloride concentration. Minor contamination from the initial drilling operations was detected by the monitor wells and removed by purging. No significant surface or groundwater contamination has been measured at Cluster 1 during the subsequent production operations. No major brine spills or leaks have occurred during the drilling and operation of the solution mining wells.

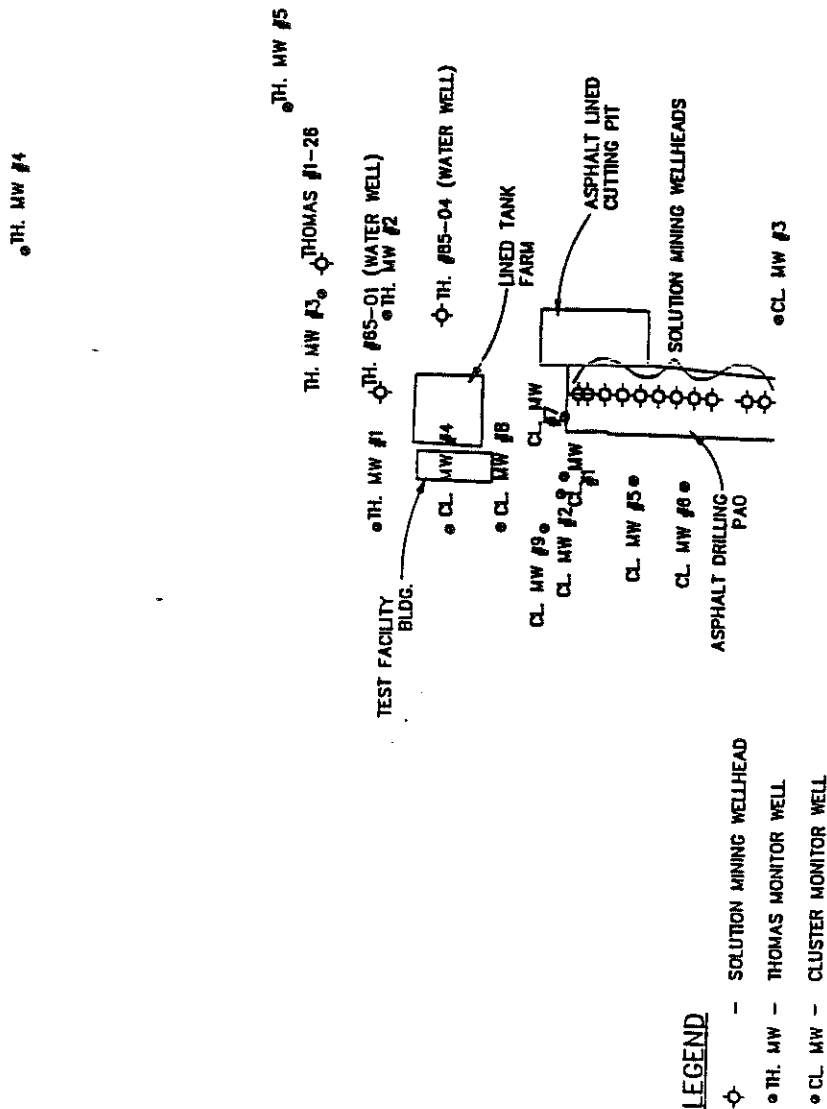
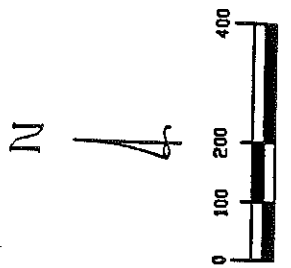
Kalium is committed to maintaining close surveillance of the existing monitor wells at Cluster 1. Similar monitoring systems have already been designed and installed at Cluster 2 in preparation for future operation of wells at this site. (See Figure P-3).

Ground water samples from both sites will continue to be gathered and field analyzed for specific conductivity and chloride concentration on a monthly basis and samples will be collected for complete chemical analysis on an annual basis.

UNIT	SUB-UNIT	ENVIRONMENT	DOMINANT LITHOLOGY
K		Valley train outwash	Sand and gravel coarsening upward, fine to v.coarse sand, pebbles and cobbles, locally cemented
J		Glaciolacustrine	Clay and silty clay, laminated to bedded, some interbeds of silt, massive silty sandy clay with pebbles common
H		Stagnant ice/outwash	Silty sandy clay, some pebbles, in part stratified
G		Till	Sandy clay till, sparse coarse fraction
F	G/1	Glaciolacustrine	Clay and silty clay, laminated to bedded, some interbeds of silt, massive silty sandy clay with pebbles common
	F/1/d	Outwash	Medium to coarse sand and minor gravel, interbeds of silty clay
	F/1/c	Glaciolacustrine	Clay and silty clay, laminated to bedded, some interbeds of silt, massive silty sandy clay with pebbles common
	F/1/b	Outwash	Medium to coarse sand and minor gravel, interbeds of silty clay
	F/1/a	Glaciolacustrine	Clay and silty clay, laminated to bedded, some interbeds of silt, massive silty sandy clay with pebbles common
E	Lower Unit F		Medium to coarse sand, minor silty clay interbeds, minor fine gravel interbeds K - 650 gpd/sq.ft
		Stagnant ice	Silty sandy clay, some pebbles, in part stratified
	E/1	Outwash	Medium to coarse sand and minor gravel, interbeds of silty clay K - 600 gpd/sq.ft
D		Till	Sandy clay till, sparse coarse fraction

Fig. P-1 Hydrogeologic units

Fig. P-2



**LEGEND**

- ◊ - SOLUTION MINING WELLHEAD
- TH. MW - THOMAS MONITOR WELL
- CL. MW - CLUSTER MONITOR WELL

**Willcox Associates**



MANITOWOC, WIS.  
(608) 221-6415

CLUSTER #1	SECTION 26, T 17 N, R 9 W
DATE: 9/27/89	HERSEY TWP., OSCEOLA COUNTY, MICH
FORM NO.	89510

Fig. P-3

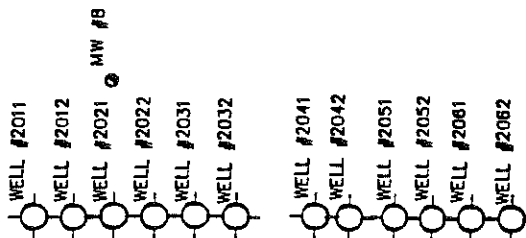
N



MW #1

MW #5

MW #2



MW #4

MW #11

MW #7

MW #3

MW #6

MW #10

MW #9

**LEGEND**

○ MW - MONITOR WELL

**Wilcox Associates, Inc.**



7711 South U.S. 131  
P.O. Box 520  
Coffeyville, MO 64601  
618 275-2733

CLUSTER #2	
SECTION 26, T 17 N, R 9 W	
HERSEY TWP., OSCEOLA CO., MICH	
DATE	12-5-90
APR. NO.	90905

ATTACHMENT Q

PLUGGING AND ABANDONMENT PLAN

EPA Checklist Items:

- Q. 1. Plugs
  - a. type
  - b. location
- Q. 2. Cement
  - a. type
  - b. grade
  - c. quantity
- Q. 3. Placement
  - a. method
  - b. static equilibrium

The plan for plugging Class III wells is as follows:

- 1. The cavity shall be depressured until the well is completely dead.
- 2. Run in with tubing and bridge plug to a point at, or near, the top of the cavity.
- 3. Set bridge plug in competent casing as close as possible to the top of the cavity.
- 4. Rig up cementing truck and set 50 sack plug of Class A cement above bridge plug. 50 sack plug, Class A = 226'.
- 5. Pull tubing up through cement to top of plug.
- 6. Continue to plug 7" casing, using 50-50 poz cement. Yield: 1.29 cu. ft./sack; 100 sack = 129 cu. ft. = 583'/100 sacks.
- 7. Continue to plug to within 226' of surface. Set 50 sack plug of Class A cement at surface. Cut off and cap 3' below surface.

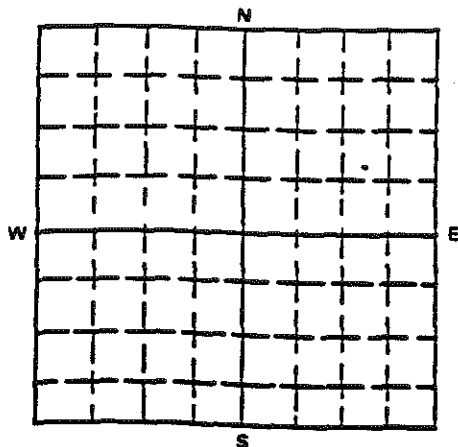


## PLUGGING AND ABANDONMENT PLAN

WELL NAME &amp; NUMBER, FIELD NAME, LEASE NAME &amp; NUMBER

Hersey Potash Facility  
Solution Mining Wells

NAME, ADDRESS, &amp; PHONE NUMBER OF OWNER/OPERATOR

Kalium Chemicals, Ltd.  
Suite 100, The East Tower  
2550 Golf Rd.; Rolling Meadows, IL 60044Locate Well And Outline Unit On  
Section Plat — 640 Acres

STATE

MI

COUNTY

Osceola

STATE PERMIT NUMBER

## SURFACE LOCATION DESCRIPTION

See Attach Q-1

## LOCATE WELL IN TWO DIRECTIONS FROM NEAREST LINES OF QUARTER SECTION AND DRILLING UNIT

Surface Area Permit - See Attach Q-2

Location \_\_\_\_\_ ft. From (N/S) \_\_\_\_\_ Line Of Quarter Section

And \_\_\_\_\_ ft. From (E/W) \_\_\_\_\_ Line Of Quarter Section

## TYPE OF AUTHORIZATION

☐ Individual Permit☐ Rule☒ Area Permit

Number of Wells

8

In Area Permit

U.S.EPA Permit Number \_\_\_\_\_

WELL  
ACTIVITY☐ Class I☐ Hazardous☐ Nonhazardous☐ Class II☐ Brine Disposal☐ Enhanced Recirculation☐ Hydrocarbon Storage☒ Class III☐ Class V

## CASING/TUBING/CEMENT RECORD AFTER PLUGGING AND ABANDONMENT

Size	WT (lb/ft) T&G/CSG	Original Amount (CSG) (ft.)	CSG to be Left in Well (ft.)	Hole Size (in.)	Sacks Cement Used	Type
13-3/8"	54	900	900	17-1/2"	700	Lite/Class A
9-5/8"	40	5450	5450	12-1/2"	1700	Lite/Class A
7"	23	7800	7800	8-1/2"	1180	Lite/Box Class H - See Attach Q-2

METHOD OF EMPLACEMENT  
OF CEMENT PLUGS

- ☐ The Balance Method  
☐ The Dump Bailer Method  
☐ The Two Plug Method  
☐ Other, Explain:  
Class H - See Attach Q-2

## CEMENT TO PLUG AND ABANDON DATA:

Size of Hole or Pipe in Which Plug Will Be Placed (inches)	Plug # 1	Plug # 2	Plug # 3	Plug # 4	Plug # 5	Plug # 6	Plug # 7	Plug # 8	Plug # 9	Plug # 10	Plug # 11	Plug # 12	Plug # 13	Plug # 14	Plug # 15
Size of Hole or Pipe in Which Plug Will Be Placed (inches)	7"													7"	7"
Calculated Top of Plug (ft.)	7574													291	0
Measured Top of Plug (ft.)															
Depth to Bottom of Plug (ft.)	7780													576	291
Sacks of Cement to be Used	50													50	60
Slurry Volume to be Used (cu. ft.)	53													64	64
Slurry Weight (lb./gal.)	15.6													14.5	15.
Type of Cement, Spacer or Other Material Used	Class A													50/50 Poz Class	
Type of Preflush Use	Brine														

## DESCRIPTION OF PLUGGING PROCEDURE

See Attachment Q-2

Estimated cost/well = \$22,000.00 Total cost for 8 wells = \$176,000.00

## ESTIMATED COST OF PLUGGING AND ABANDONMENT

Cement	\$	Cast Iron Bridge Plug	\$
Logging	\$	Cement Retainer	\$
Rig or Pulling Unit	\$	Miscellaneous	\$

## CERTIFICATION

I certify under the penalty of law that I have examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment. (Ref. 40 CFR 144.32)

NAME AND OFFICIAL TITLE (Please type or print)

Donald D. Metzger  
Resident Manager

SIGNATURE

DATE SIGNED

11-27-91





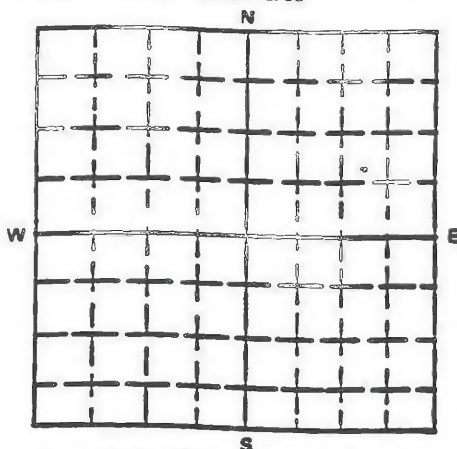
## PLUGGING AND ABANDONMENT PLAN

1985

WELL NAME &amp; NUMBER, FIELD NAME, LEASE NAME &amp; NUMBER

Hersey Potash Facility  
Solution Mining Wells

NAME, ADDRESS, &amp; PHONE NUMBER OF OWNER/OPER.

Kalium Chemicals, Ltd.  
Suite 100, The East Tower, 2550 Golf Road  
Rolling Meadows, IL 60008-4051Locate Well And Outline Unit On  
Section Plat — 640 Acres

STATE

MI

COUNTY

Osceola

STATE PERMIT NUMBER

## SURFACE LOCATION DESCRIPTION

See Attached Q-1

LOCATE WELL IN TWO DIRECTIONS FROM NEAREST LINES OF QUARTER SECTION AND DRILLING UNIT

Surface Area Permit - See Attach Q-2

Location \_\_\_\_\_ ft. From (N/S) \_\_\_\_\_ Line Of Quarter Section

And \_\_\_\_\_ ft. From (E/W) \_\_\_\_\_ Line Of Quarter Section

## TYPE OF AUTHORIZATION

☐ Individual Permit☐ Rule☒ Area PermitNumber of Wells 8  
In Area Permit \_\_\_\_\_

U.S. EPA Permit Number \_\_\_\_\_

WELL  
ACTIVITY☐ Class I☐ Hazardous☐ Nonhazardous☐ Class II☐ Brine Disposal☐ Enhanced Recovery☐ Hydrocarbon☒ Class III☐ Class V

## CASING/TUBING/CEMENT RECORD AFTER PLUGGING AND ABANDONMENT

Size	Wt (lb/ft) TBG/CSG	Original Amount (CSG) (ft.)	CSG to be Left in Well (ft.)	Hole Size (in.)	Static Cement Class	Type
18-5/8	86	600	600	24"	840	Lite/Class A
13-3/8	54	900	900	17-1/2"	700	Lite/Class A
9-5/8	40	5450	5450	12-1/4"	1700	Lite/Class A
7	23-29	7800	7800	8-1/2"	1180	Lite/Class A

CEMENT TO PLUG AND ABANDON DATA:							METHOD OF EMPLACEMENT OF CEMENT PLUGS	
Size of Hole or Pipe in Which Plug Will Be Placed (inches)	7	Plug # 1	Plug #	Plug #	Plug #	Plug #	Plug # 14	Plug #
Calculated Top of Plug (ft.)	7574	Plugs 2 through 13 7574 to 576 feet continuous cement in 100 sack (583') intervals. Use 50-50 Poz cement at 14.5 lb/gal.					7	7
Measured Top of Plug (ft.)							291	0
Depth to Bottom of Plug (ft.)	7780						576	291
Sacks of Cement to be Used	50						50	60
Slurry Volume to be Used (cu. ft.)	53						64	64
Slurry Weight (lb./gal.)	15.6						14.5	15
Type of Cement, Spacer or Other Material Used	Class A						50/50Poz	Class
Type of Preflush Used	Brine							

## DESCRIPTION OF PLUGGING PROCEDURE

See Attachment Q-2

Estimated cost/well = \$22,000.00 Total cost for 8 wells = \$176,000.00

## ESTIMATED COST OF PLUGGING AND ABANDONMENT

Cement	\$	Cast Iron Bridge Plug	\$
Logging	\$	Cement Retainer	\$
Rig or Pulling Unit	\$	Miscellaneous	\$

## CERTIFICATION

I certify under the penalty of law that I have examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment. (Ref. 40 CFR 144.32)

NAME AND OFFICIAL TITLE (Please type or print)

Donald D. Metzger  
Resident Manager

SIGNATURE

DATE SIGNED

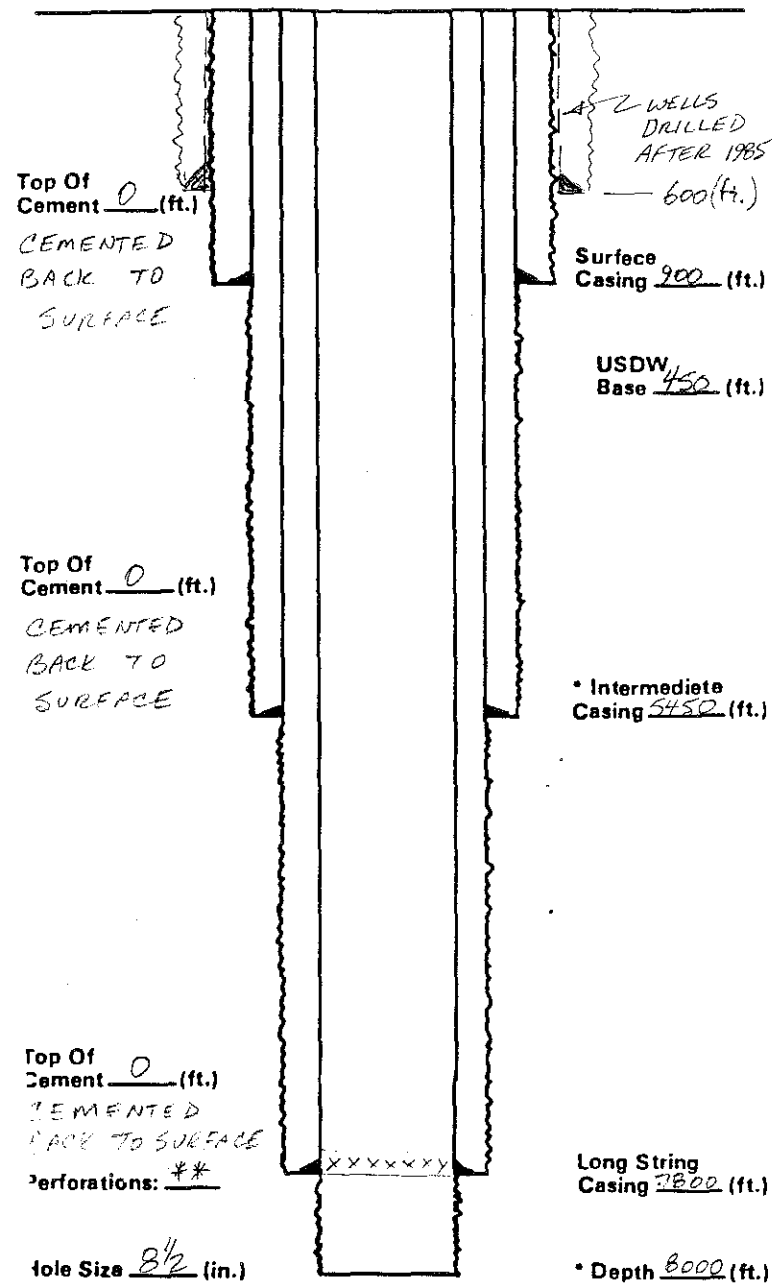
11-27-81

## ORIGINAL WELL CONSTRUCTION DURING OPERATION

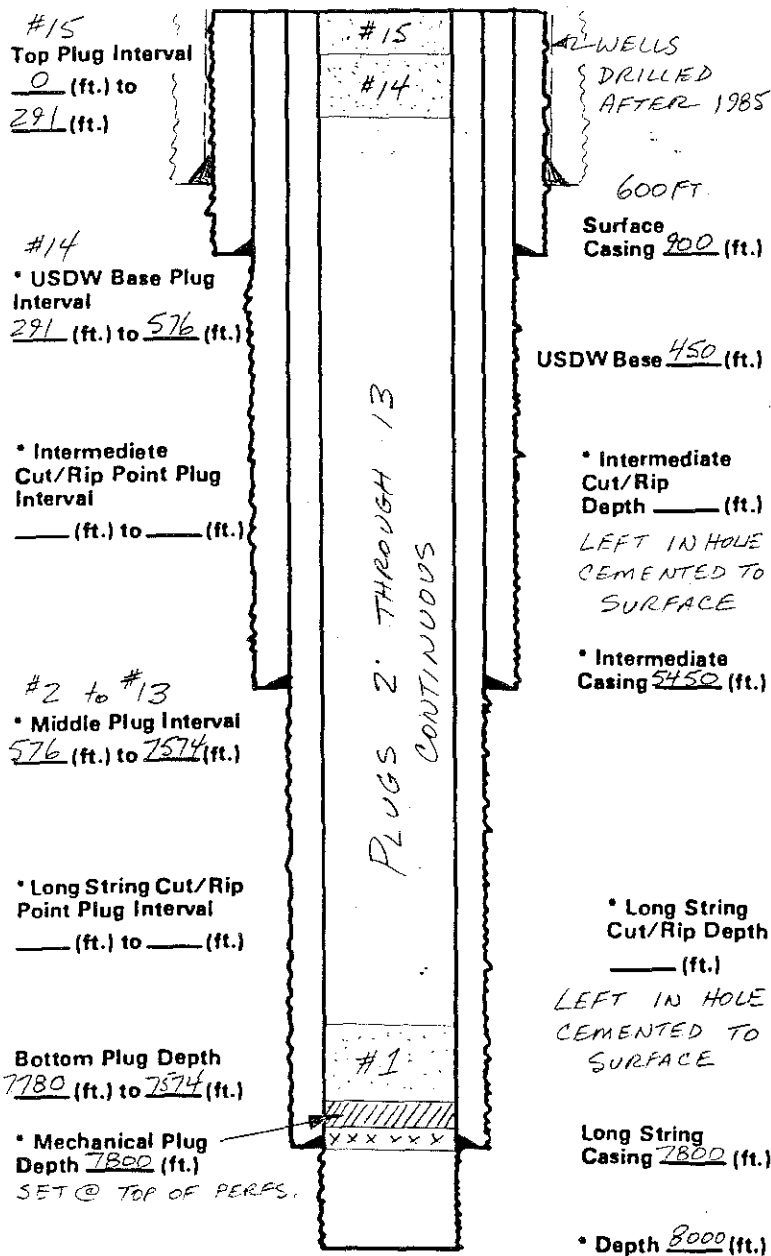
## PLUGGING AND ABANDONMENT CONSTRUCTION

Surface

Surface



\* Add Any Additional Information  
May Not Apply



\*\* Add Any Additional Information  
\* May Not Apply

## LIST OF ALL OPEN AND/OR PERFORATED INTERVALS AND INTERVALS WHERE CASING WILL BE VARIED

Specific Open Hole/Perforations/Varied Casing	From	To	Formation Name
BOTTOM 20 FT. OF 7"	7780	7800	A-1 EVAPORITE
CASING PERFORATED			

8. Summary: Set bridge plug at 7,800'.

1st plug	7,800-7,574'	Class A, 3% Cl <sub>2</sub>	50 sacks
2nd plug	7,574-6,991'	50-50 pos	100 sacks
3rd plug	6,991-6,400'	50-50 poz	100 sacks
4th plug	6,400-5,825'	50-50 pos	100 sacks
5th plug	5,825-5,242'	50-50 pos	100 sacks
6th plug	5,242-4,659'	50-50 pos	100 sacks
7th plug	4,659-4,076'	50-50 pos	100 sacks
8th plug	4,076-3,493'	50-50 pos	100 sacks
9th plug	3,493-2,910'	50-50 pos	100 sacks
10th plug	2,910-2,327'	50-50 pos	100 sacks
11th plug	2,327-1,744'	50-50 pos	100 sacks
12th plug	1,744-1,161'	50-50 pos	100 sacks
13th plug	1,161- 576'	50-50 pos	100 sacks
14th plug	576- 291'	50-50 pos	50 sacks
15th plug	291- 0'	50-50 pos	60 sacks

ATTACHMENT R  
NECESSARY RESOURCES

EPA Checklist Items:

Certificate of necessary resources for plugging well.

Kalium Chemicals has submitted the required financial statements with the Class I permit applications, Numbers MI-133II-0001, 0002 and 0003.

No additional documents are being submitted with this Class III permit application since it is believed that information furnished with the previous Class I permit application adequately covers the requirements.

## CHIEF FINANCIAL OFFICER'S LETTER

U. S. Environmental Protection Agency  
Underground Injection Control  
Class III Injection Well Operators

This letter contains information submitted as evidence of financial responsibility for the Environmental Protection Agency's underground injection control requirements.

Submitted to: Regional Administrator  
Environmental Protection Agency Region 5  
230 S. Dearborn Street  
5W0-7UB-5  
Chicago, IL 60604

Submitted for: Kalium Chemicals, Ltd.  
P.O. Box 333  
11461 S 135th Avenue  
Hersey, MI 49639


Type of Organization: Corporation

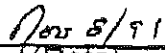
Date of incorporation: August 18, 1987

State of incorporation: Delaware

Submitted by: Dale W Ward  
Kalium Chemicals, Ltd.  
1200 - 1801 Hamilton Street,  
Regina, Saskatchewan  
S4P 4B5

I hereby certify that the financial information contained on the following pages is correct and derived from this firm's year-end financial statements prepared in the normal course of business for the latest completed fiscal year ended June 30, 1991.

  
\_\_\_\_\_  
Vice President  
Finance & Administration

  
\_\_\_\_\_  
(Date)

- I. Kalium Chemicals, Ltd. is the owner or operator of Class III injection wells in the following states within EPA Region 5:

State Name: Michigan

- II. This firm guarantees the plugging and abandonment of injection wells owned or operated by the following subsidiaries:

Subsidiary Name and Address:

N/A

- III. This firm is not required to file a form 10k with the Securities and Exchange Commission (SEC) for the latest fiscal year.

- IV. The fiscal year of this firm ended on June 30. The financial information contained in this letter is derived from this firm's year end financial statements prepared in the normal course of business for the latest completed fiscal year ended June 30, 1991. Note: Short year August 1, 1990 - June 30/91 due to change in year end.

The name and address of the accounting firm examining these financial statements:

Arthur Andersen & Co.  
Chartered Accountants  
2200 - 355 - 4th Ave. S.W.  
Calgary, Alberta  
T2P 0J1

V. The dollar amounts below are stated in thousands of dollars.

FINANCIAL INFORMATION

Balance Sheet Information:

1.	Current Assets	\$ 39,119
2.	Total Assets	\$200,508
3.	Current Liabilities	\$ 22,242
4.	Total Liabilities	\$128,877
5.	Net Worth or Stockholder's Equity	\$ 71,631

Income Statement Information:

6.	Depreciation, Depletion, and Amortization	\$ 10,265 (11 mths) actual
7.	Net Income	\$ 19,370 (11 mths) actual

Calculations:

8.	Total Liabilities less Current Liabilities (Item 4 - Item 3)	\$106,635
9.	Depreciation, Depletion, and Amortization plus Net Income (Item 6 + Item 7)	\$ 29,635 (11 mths) actual
10.	Current Assets less Current Liabilities (Item 1 - Item 3) indicate negative numbers with parentheses)	\$ 16,877
11.	Current Liabilities divided by Net Worth (Item 3 + Item 5)	0.31
12.	Total Liabilities less Current Liabilities, all divided by Net Worth	1.49
13.	Depreciation, Depletion, and Amortization plus Net Income, all divided by Total Liabilities	0.23



14. Current Assets less Current Liabilities  
all Divided by Total Assets 0.08

VI. Based on the information in Part V, the company meets or does not meet the financial ratio requirements, as indicated.

	<u>YES</u>	<u>NO</u>
1. Current Liabilities + Net Worth less than 1.0	X	
2. Long-term Liabilities + Net Worth less than 2.0	X	
3. New Income greater than zero.	X	
4. Net Income + depreciation, depletion and amortization total + total liabilities	X	
5. Working Capital + Total Assets greater than -0.10	X	
6. Net Worth > 1 million dollars	X	

VII. This firm has not received a rating by either Standard and Poor's or Moody's.

The current bond rating of most recent issuance of this firm N/A

KALIUM CANADA, LTD.INTEROFFICE CORRESPONDENCE

REF: DW2010

TO: ROB PLOSZ SUBJECT: MICHIGAN - EPA

FROM: DALE WARD DATE: NOVEMBER 8, 1991

Attached is a completed CFO Letter which you requested for the Michigan Project. You will need to provide the following information in support of the CFO Letter and may submit a copy of this memo with the letter if you wish.

The financial information is from the audited statements of KCL Holdings, Inc., a Delaware Corporation established August 18, 1987. KCL Holdings owns 100% of Kalium Chemicals, Ltd. which owns the Michigan assets. Kalium Chemicals, Ltd. owns 100% of Kalium Canada, Ltd., a Canadian corporation. KCL Holdings, Inc. has no other business activity and owns no other assets.

Audited statements are available at the KCL Holdings, Inc. level but there are no audited statements for Kalium Chemicals, Ltd. The financial impact of KCL Holdings on the consolidated results is negligible.

DWW/BS



ATTACHMENT S  
AQUIFER EXEMPTIONS

This item does not apply since no aquifer exemptions are being requested.

ATTACHMENT T  
EXISTING EPA PERMITS

EPA Checklist Items:

1. NPDES - None
2. PSD - None
3. RCRA - None
4. Underground Injection Control (Potash Test Facility)
  - Disposal Wells MI-133-II-0001, 0002, 0003
  - Solution Mining Wells MIA-133-3G-0001

## ATTACHMENT U

### DESCRIPTION OF BUSINESS

PPG Industries, Inc. (PPG) discovered significant potash-bearing deposits in an area spanning the border between Mecosta and Osceola Counties in Michigan. The potash mineralization occurs within the A-1 Evaporite of the Salina Group of formations which lie 7500 to 7800 feet below surface.

PPG constructed and operated a solution mining test facility in 1985 and 1986 to confirm the workability of solution mining techniques and to demonstrate the feasibility of injecting disposal brine into a suitable porous and permeable subsurface rock formation. Potash minerals were not extracted from the brine produced during the test facility operation. PPG operated this facility under UIC Class I Disposal Well permits MI-133-1I-0001, MI-133-1I-0002 and MI-133-1I-0003, and Class III Solution Mining Well area permit MIA-133-3G-0001. Results from the test facility were encouraging, however, a downturn in the Potash industry forced PPG to terminate testwork in July 1986 and delay expenditures on a commercial production facility.

In November, 1987 PPG sold all of its Potash interests, including the Michigan project, to Sullivan and Proops (S & P) of Chicago. The EPA operating permits were transferred to Kalium Chemicals, Ltd. (Kalium), a fully owned subsidiary of S & P. In April, 1991, the privately held companies of S & P including Kalium became a publicly traded company on the NYSE under the Vigoro name. Kalium continues to operate with the Kalium name within the Vigoro Corporation.

In 1989 Kalium constructed a small commercial production facility to process the potash brines produced from the solution mining wells. The facility remains in operation today selling potash minerals into the U. S. agricultural market.

The Michigan potash facility supplements Kalium's primary potash production facility situated at Belle Plaine, Saskatchewan, Canada. Kalium's administrative offices are located in Chicago, Illinois and Regina, Saskatchewan, Canada.

5. Kalium markets potash worldwide with the major percentage used as fertilizer and the balance in chemical and industrial applications.

Kalium's mining process in Michigan involves pumping a solution through boreholes into potash beds 7500 feet below the surface, dissolving the potash-bearing portion of the ores and returning the solution to surface for refining. The solution is processed through a series of crystallizers where the potash crystals are formed. The crystals are then dried and sifted through a series of special screens to assure a consistent particle size.

The mining operation produces some solution that is not of high enough quality to be refined. (This weaker solution is disposed into a porous limestone formation 4000 feet below surface.)

Kalium ships bulk potash via hopper trucks directly to customers or to offsite storage warehouses.

## WATER WELL RECORD

ACT 294 PA 1965

MICHIGAN DEPARTMENT  
OF  
PUBLIC HEALTH

LOCATION OF WELL 67170935 001		Township Name Oshtemo		Range Number 17 N/4		Section Number 35		Range Number 9 E/W.	
Distance And Direction from Road Intersections about .25 mile South of Schofield Road and about .1 mile West of 130th Avenue		Sketch Map: Schofield Rd. 130th Ave .25 mi. .1 mi.		3 OWNER OF WELL: Jim Eichenberg Address 8158 N. Morrish Road Flushing, MI 48433					
Street address & City of Well Location Locate with "X" in section below		4 WELL DEPTH: (completed) Date of Completion 158 ft. 7-20-85		5 <input type="checkbox"/> Cable tool <input type="checkbox"/> Rotary <input type="checkbox"/> Driven <input type="checkbox"/> Dug <input checked="" type="checkbox"/> Hollow rod <input type="checkbox"/> Jetted <input type="checkbox"/> Bored					
		6 USE: <input checked="" type="checkbox"/> Domestic <input type="checkbox"/> Public Supply <input type="checkbox"/> Industry <input type="checkbox"/> Irrigation <input type="checkbox"/> Air Conditioning <input type="checkbox"/> Commercial <input type="checkbox"/> Test Well		7 CASING: Threaded <input checked="" type="checkbox"/> Welded <input type="checkbox"/> Diam. 2 in. to 154 ft. Depth Height: Above/Below Surface 1 ft. Weight 3.75 lbs./ft. Drive Shoe? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>					
2 FORMATION		THICKNESS OF STRATUM		DEPTH TO BOTTOM OF STRATUM		8 SCREEN: Type: Clayton Mark Dia.: 1 1/2" Slot/Gauze 80 Length 4 ft. Set between 154 ft. and 158 ft. Fittings: Bremer & K-packer			
Sand		92		92		9 STATIC WATER LEVEL 103 ft. below land surface			
Red Clay & Sand		26		118		10 PUMPING LEVEL below land surface 103 ft. after 1 hrs. pumping 10 g.p.m.			
Blue Clay		28		146		11 WATER QUALITY in Parts Per Million: Iron (Fe) Chlorides (Cl) Hardness Other			
Blue Clay with Sand Strips		4		150		12 WELL HEAD COMPLETION: <input checked="" type="checkbox"/> In Approved Pit <input type="checkbox"/> Pitless Adapter <input type="checkbox"/> 12" Above Grade			
Sand with Blue Clay Chips		4		154		13 Well Grouted? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Neat Cement <input type="checkbox"/> Bentonite Depth: From ft. to ft.			
Sand		4		158		14 Nearest Source of possible contamination 50 feet SW Direction Septic Type Well disinfected upon completion <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No			
						15 PUMP: <input type="checkbox"/> Not installed Manufacturer's Name Flint & Walling Model Number C6269-H HP 1 Volts 230 Length of Drop Pipe 126 ft. capacity 5 G.P.M. Type: <input type="checkbox"/> Submersible <input checked="" type="checkbox"/> Jet <input type="checkbox"/> Reciprocating			
16 Remarks, elevation, source of data, etc.		17 WATER WELL CONTRACTOR'S CERTIFICATION: This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief. Pekrul Well Drilling 67-1297 REGISTERED BUSINESS NAME REGISTRATION NO. Address 19985 Hoover Rd., Big Rapids, MI Signed L. J. Driskill Data 2-22-86 AUTHORIZED REPRESENTATIVE							



# HIGAN DEPARTMENT OF PUBLIC HEALTH WATER WELL AND PUMP RECORD

PERMIT NUMBER  

<b>1 LOCATION OF WELL</b>			<b>3 OWNER OF WELL:</b>		
County <b>SCOTLAND</b>	Township Name <b>HERSEY</b>	Fraction <b>NE 1/4 SE 1/4 NE 1/4</b>	Section Number <b>27</b>	Town Number <b>17 N/2</b>	Range Number <b>9 EW</b>
Distance And Direction From Road Intersection <b>3/4 MILE SOUTH OF HERSEY RD. ON 140th AVE. - WEST SIDE OF 140th AVE.</b>			Address <b>140th AVE HERSEY</b> Address Same As Well Location? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		
Street Address & City of Well Location Locate with "X" in Section Below			4 WELL DEPTH: <b>95</b> FT. Date Completed <b>9-14-89</b>		
			<input type="checkbox"/> New Well <input type="checkbox"/> Replacement Well <input type="checkbox"/> Cable tool <input type="checkbox"/> Rotary <input type="checkbox"/> Driven <input type="checkbox"/> Dug <input type="checkbox"/> Hollow rod <input type="checkbox"/> Auger <input checked="" type="checkbox"/> Jetted		
2 FORMATION DESCRIPTION			6 USE: <input checked="" type="checkbox"/> Domestic <input type="checkbox"/> Type I Public <input type="checkbox"/> Type II Public <input type="checkbox"/> Irrigation <input type="checkbox"/> Type IIa Public <input type="checkbox"/> Heat pump <input type="checkbox"/> Test Well <input type="checkbox"/> Type IIb Public		
			7 CASING: <input checked="" type="checkbox"/> Steel <input type="checkbox"/> Threaded <input type="checkbox"/> Welded <input type="checkbox"/> Plastic <input type="checkbox"/> Diameter <b>2</b> in. to <b>20</b> ft. depth <input checked="" type="checkbox"/> Grouted Drill Hole Diameter <b>1 1/4</b> in. to <b>95</b> ft. depth Hight: Above/Below Surface <b>1</b> ft. Weight <b>3.75</b> lbs./ft. Drive Shoes <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		
SAND COARSE GRAVEL SAND RED CLAY CLAY & SAND FINE SAND			THICKNESS OF STRATUM <b>0</b> <b>38</b> <b>40</b> <b>70</b> <b>71</b> <b>87</b> <b>95</b>		
			8 SCREEN: <input type="checkbox"/> Not Installed Type <b>BRASS</b> Diameter <b>1 1/4"</b> Gauge <b>#90</b> Length <b>48"</b> Set between <b>90</b> ft. and <b>95</b> ft. FITTINGS: <input type="checkbox"/> K-Packer <input type="checkbox"/> Lead Packer <input checked="" type="checkbox"/> Grinner Check <input checked="" type="checkbox"/> Blank above screen <b>1</b> ft. Dthar		
			9 STATIC WATER LEVEL: <b>54</b> ft. below land surface <input type="checkbox"/> Flow		
			10 PUMPING LEVEL: below land surface <b>54</b> ft. after <b>1</b> hrs. pumping at <b>10</b> G.P.M. ft. after hrs. pumping at G.P.M.		
			11 WELL HEAD COMPLETION: <input checked="" type="checkbox"/> Fitless adapter <input type="checkbox"/> 12" above grade <input type="checkbox"/> Basement offset <input type="checkbox"/> Approved pit		
			12 WELL GROUTED? <input type="checkbox"/> No <input type="checkbox"/> Yes From to ft. <input type="checkbox"/> Neat cement <input type="checkbox"/> Bentonite <input type="checkbox"/> Other No. of bags of cement Additives		
			13 Nearest source of possible contamination <b>SEPIC FIELD</b> Distance <b>50</b> ft. Direction <b>W</b> Well disinfected upon completion? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Was old well plugged? <input type="checkbox"/> Yes <input type="checkbox"/> No		
			14 PUMP: <input type="checkbox"/> Not Installed <input type="checkbox"/> Pump Installation Only Manufacturer's name <b>FW</b> Model number <b>CR201</b> HP <b>3/4</b> Volts <b>110</b> Length of Drop Pipe <b>80</b> ft. capacity <b>10</b> G.P.M. TYPE: <input type="checkbox"/> Submersible <input checked="" type="checkbox"/> Jet PRESSURE TANK: <b>NA</b> Manufacturer's name Model number Capacity Gallons		
15. Remarks, elevation, source of data, etc.			16. WATER WELL CONTRACTOR'S CERTIFICATION: This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief. <b>Robert W. Downing</b> 1801 REGISTERED BUSINESS NAME: <b>RE 3 Corp</b> ADDRESS: <b>188 Reed City, MI</b> Signed <b>Robert W. Downing</b> Date <b>9-14-89</b> AUTHORIZED REPRESENTATIVE		
17. Rig Operator's Name:					

## WATER WELL AND PUMP RECORD

67170926004

4	8	9	6	7	0	0	0	2
---	---	---	---	---	---	---	---	---


PERMIT NUMBER

1 LOCATION OF WELL		County <u>Washtenaw</u>		Township Name <u>Hersey</u>		Fraction <u>SE 1/4 NE 1/4 SW 1/4</u>		Section Number <u>26</u>		Town Number <u>17 N/8</u>		Range Number <u>9 E/W</u>	
Distance And Direction From Road Intersection <u>1.6 mi So. of 2 mi Rd &amp; 135th</u> <u>15' on West side of 135th</u>													
Street Address & City of Well Location Locate with "X" in Section Below													
<div style="display: flex; align-items: center;"> <div style="flex: 1;"> </div> <div style="flex: 1;"> <p>Sketch Map:</p> <p><u>2 mi Rd</u></p> <p><u>140th</u></p> <p><u>135th</u></p> </div> </div>													
3 OWNER OF WELL: <u>Kalium Chemicals</u> Address <u>P.O. Box 333</u> <u>1126 So. 140th St.</u> <u>Hersey MI 49639</u> Address Same As Well Location? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No													
4 WELL DEPTH: (completed) <u>317</u> ft. Date of Completion _____													
5 <input type="checkbox"/> Cable tool <input checked="" type="checkbox"/> Rotary <input type="checkbox"/> Driven <input type="checkbox"/> Dug <input type="checkbox"/> Hollow rod <input type="checkbox"/> Auger <input type="checkbox"/> Jetted <input type="checkbox"/>													
6 USE: <input type="checkbox"/> Domestic <input type="checkbox"/> Type I Public <input type="checkbox"/> Type III Public <input type="checkbox"/> Irrigation <input type="checkbox"/> Type IIa Public <input type="checkbox"/> Heat pump <input type="checkbox"/> Test Well <input type="checkbox"/> Type IIb Public <input type="checkbox"/>													
7 CASING: <input checked="" type="checkbox"/> Steel <input checked="" type="checkbox"/> Threaded <input type="checkbox"/> Height: Above/Below <input type="checkbox"/> Plastic <input type="checkbox"/> Welded <u>4</u> in. to <u>300</u> ft. depth <u>7</u> in. to <u>300</u> ft. depth Grouted Drill Hole Diameter <u>7</u> in. to <u>300</u> ft. depth <u>7</u> in. to _____ ft. depth Surface <u>2</u> ft. Weight <u>11</u> lbs./ft. Drive Shoe <input type="checkbox"/> Yes <input type="checkbox"/> No													
8 SCREEN: <input type="checkbox"/> Not Installed Type <u>Johnson S.S.</u> Diameter <u>3</u> Slot/Gauge <u>10</u> Length <u>15'</u> Set between <u>302</u> ft. and <u>317</u> ft. FITTINGS: <input checked="" type="checkbox"/> K-Packer <input type="checkbox"/> Lead Packer <input type="checkbox"/> Bramer Check <input type="checkbox"/> Blank above screen _____ ft. Other _____													
9 STATIC WATER LEVEL: <u>198</u> ft. below land surface <input type="checkbox"/> Flow													
10 PUMPING LEVEL: below land surface _____ ft. after _____ hrs. pumping at _____ G.P.M. _____ ft. after _____ hrs. pumping at _____ G.P.M.													
11 WELL HEAD COMPLETION: <input checked="" type="checkbox"/> Pitless adapter <input type="checkbox"/> 12" above grade <input type="checkbox"/> Basement offset <input type="checkbox"/> Approved pit													
12 WELL GROUTED? <input type="checkbox"/> No <input checked="" type="checkbox"/> Yes From <u>0</u> to <u>300</u> ft. <input checked="" type="checkbox"/> Neat cement <input type="checkbox"/> Bentonite <input type="checkbox"/> Other _____ No. of bags of cement <u>26</u> Additives _____													
13 Nearest source of possible contamination Type <u>Septic</u> Distance <u>85</u> ft. Direction <u>West</u> Well disinfected upon completion? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No													
14 PUMP: <input type="checkbox"/> Not installed <input type="checkbox"/> Pump installation Only Manufacturer's name <u>Flint/Walling</u> Model number <u>FF55</u> HP <u>5</u> Volts <u>230</u> Length of Drop Pipe <u>277</u> ft. capacity <u>35</u> G.P.M. TYPE: <input checked="" type="checkbox"/> Submersible <input type="checkbox"/> Jet PRESSURE TANK: Manufacturer's name _____ Model number _____ Capacity _____ Gallons													
15. Remarks, elevation, source of data, etc.													
16. WATER WELL CONTRACTOR'S CERTIFICATION: This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief. <u>L &amp; R Well Drilling Inc</u> <u>1770</u> REGISTERED BUSINESS NAME REGISTRATION NO. Address <u>RR #1 Box 78 Elmira 4973</u> Signed <u>Don Shumaker</u> Date <u>4-12-89</u> AUTHORIZED REPRESENTATIVE													

USE A 2ND SHEET IF NEEDED

## WATER WELL AND PUMP RECORD

PERMIT NUMBER

1. LOCATION OF WELL		County: <u>OSCEOLA</u>		Township Name: <u>Hersey</u>		Fraction: <u>NE 1/4 NW 1/4</u>		Section Number: <u>23</u>		Town Number: <u>17N</u>		Range Number: <u>9W</u>	
Distance And Direction From Road Intersection <u>1/4 mi E of 135th on Hersey Rd.</u> <u>WEST Side of Rd.</u>						3. OWNER OF WELL: <u>Lloyd Sopre</u> Address <u>2381 W. Hersey Rd.</u> <u>Hersey MI</u> Address Same As Well Location? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No							
Street Address & City of Well Location						4. WELL DEPTH: Date Completed <u>6/3/91</u> <u>31</u> FT. <input checked="" type="checkbox"/> New Well <input type="checkbox"/> Replacement Well							
Locate with "X" in Section Below						5. <input type="checkbox"/> Cable tool <input type="checkbox"/> Rotary <input checked="" type="checkbox"/> Driven <input type="checkbox"/> Dug <input type="checkbox"/> Hollow rod <input type="checkbox"/> Auger <input checked="" type="checkbox"/> Jetted							
Sketch Map: 						6. USE: <input checked="" type="checkbox"/> Domestic <input type="checkbox"/> Type I Public <input type="checkbox"/> Type III Public <input type="checkbox"/> Irrigation <input type="checkbox"/> Type IIa Public <input type="checkbox"/> Heat pump <input type="checkbox"/> Test Well <input type="checkbox"/> Type IIb Public							
2. FORMATION DESCRIPTION						7. CASING: Diameter <input checked="" type="checkbox"/> Steel <input type="checkbox"/> Thruaded <input type="checkbox"/> Plastic <input type="checkbox"/> Welded <u>2</u> in. to <u>27</u> ft. depth <u>1 1/2</u> in. to <u>31</u> ft. depth Grouted Drill Hole Diameter in. to ft. depth							
THICKNESS OF STRATUM						Height: Above/Below Surface <u>1</u> ft. Weight <u>325</u> lbs/ft. Drive Shoe <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No							
DEPTH TO BOTTOM OF STRATUM						8. SCREEN: <input type="checkbox"/> Not installed Type <u>Cross</u> Diameter <u>1 1/2</u> Slot/Gauze <u>80</u> Length <u>4</u> Set between <u>27</u> ft. and <u>31</u> ft. FITTINGS: <input checked="" type="checkbox"/> K-Packer <input type="checkbox"/> Lead Packer <input checked="" type="checkbox"/> Brainer Check <input checked="" type="checkbox"/> Blank above screen <u>2</u> ft. Other							
SAUD						9. STATIC WATER LEVEL: <u>7</u> ft. below land surface <input type="checkbox"/> Flow							
Clay						10. PUMPING LEVEL: below land surface <u>7</u> ft. after <u>1</u> hrs. pumping at <u>10</u> G.P.M. ft. after hrs. pumping at G.P.M.							
SAUD						11. WELL HEAD COMPLETION: <input checked="" type="checkbox"/> Pitless adapter <input type="checkbox"/> 12" above grade <input type="checkbox"/> Basement offset <input type="checkbox"/> Approved pit							
						12. WELL GROUTED? <input type="checkbox"/> No <input checked="" type="checkbox"/> Yes From to ft. <input type="checkbox"/> Neat cement <input type="checkbox"/> Bentonite <input type="checkbox"/> Other <u>several</u> No. of bags of cement Additives							
						13. Nearest source of possible contamination Type <u>septic</u> Distance <u>50</u> ft. Direction <u>W</u> Well disinfected upon completion? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Was old well plugged? <input type="checkbox"/> Yes <input type="checkbox"/> No							
						14. PUMP: <input type="checkbox"/> Not installed <input type="checkbox"/> Pump installation only Manufacturer's name <u>F.W.</u> Model number <u>CPJES</u> HP <u>1/2</u> Volts <u>110</u> Length of Drop Pipe <u>21</u> ft. capacity <u>10</u> G.P.M. TYPE: <input type="checkbox"/> Submersible <input checked="" type="checkbox"/> Jet PRESSURE TANK: Manufacturer's name <u>CON-AIR</u> Model number <u>427</u> Capacity <u>6</u> Gallons							
15. Remarks, elevation, source of data, etc.						16. WATER WELL CONTRACTOR'S CERTIFICATION: This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief. <u>SJS water wells</u> <u>1747</u> REGISTERED BUSINESS NAME REGISTRATION NO. Address <u>9822 McCreola Rd.</u> <u>Paris</u> Signed <u>Stimil Doughton</u> Date <u>6/3/91</u> AUTHORIZED REPRESENTATIVE							
17. Rig Operator's Name:						Authority: <u>Act 368 PA 1978</u> Completion: <u>Required</u> Penalty: <u>Conviction of a violation of any provision is a misdemeanor</u>							

LOG OF OIL, GAS, DISPOSAL OR STORAGE WELL (ACT 61)  
Submit in DUPLICATE Within 30 Days after Well Completion

36600  
DEEPENING PERMIT NUMBER

NAME(S) & ADDRESS OF OWNER(S) SHOWN ON PERMIT PPG Oil & Gas Co., Inc. 2258 Enterprise Drive Mt. Pleasant, MI 48858				NAME & ADDRESS OF DRILLING CONTRACTOR(S) T. D. Provins Drilling Company 2113 Enterprise Drive Mt. Pleasant, MI 48858			
LEASE NAME(S) & WELL NUMBER SHOWN ON PERMIT Thomas #1-26						DIRECTIONALLY DRILLED YES <input type="checkbox"/> NO <input checked="" type="checkbox"/>	
SURFACE LOCATION NE NW NW		SECTION 26	TOWNSHIP 17N	RANGE 9W	TOWNSHIP NAME Hersey		
FOOTAGES (North/South) 460 Ft. from North		LINE AND 864		FOOTAGES (East/West) Ft. from West		COUNTY NAME Osceola	
SUBSURFACE LOCATION		SECTION	TOWNSHIP	RANGE	TOWNSHIP NAME		
FOOTAGES (North/South)		LINE AND		FOOTAGES (East/West)		COUNTY NAME	
Ft. from		Line and		Ft. from		Line of quarter section	
DRILLING BEGUN 3-12-83		TOTAL DEPTH OF WELL Driller 8085 Log 8091		TYPE WELL Temp. Abandoned		ELEVATIONS	
DRILLING COMPLETED 1-06-84		FORMATION AT T.D. Cabot Head		FT. DRLD. - ROTARY TOOLS From 0 To 8091		K.B. 1137.2	R.F. 1135.8
WELL COMPLETED		PRODUCING FORMATION(S)		FT. DRLD. - CABLE TOOLS From To		R.T.	Grd. 1121.6

CASING, CASING LINERS AND CEMENTING

PERFORATIONS

SIZE	WHERE SET	CEMENT	Ft. Pulled	DATE	NUMBER HOLES	INTERVAL PERFORATED	OPEN	
							YES	NO
20"	68	DP						
13 3/8	896	700 sx						
9 5/8	5417	1700 sx						

GROSS PAY INTERVALS

ALL OTHER OIL AND GAS SHOWS OBSERVED OR LOGGED

FORMATION	OIL OR GAS	FROM	TO	FORMATION	OIL OR GAS	DEPTH	WHERE OBSERVED (X)					
							Sam- ples	Odor	Gas	Mud Line	Gas Log	Ful Up
None				Antrim	Gas	3050					XX	
				Trav. Lm	Gas	3596					XX	
				Burnt Bluff	Gas	7982					XX	

STIMULATION BY ACID OR FRACTURING

WATER FILL UP (F.U.) OR LOST CIRCULATION (L.C.) (X)

DATE	Interval Treated	Materials and amount used	FORMATION	F.U.	L.C.	DEPTH	AMOUNT
	None		None				

MECHANICAL LOGS, LIST EACH TYPE RUN

DEPTH CORRECTION DEVIATION SURVEY PLUGGED BACK

Brand	(X)	LOG TYPES	LOGGED INTERVALS	DEPTH	CORRECTN	RUN AT	DEGREES	YES	NO	DEPTH
Schlumberger	XX	LDT-CNL-GR	100 - 8091			1500	3/4°			
Birdwell		Sonic	897 - 8091			3700	3/4°			
		DLL-MLL	3200 - 5405			5093	1/4°			
			5420 - 8076			7816	2 1/2°			

PRODUCTION TEST DATA

OIL - Bbls/day	GRAVITY - °API	COND. Bbls/day	GAS - MCF/day	WATER - Bbls/day	H <sub>2</sub> S - Grains/100 cu. ft.	B.H.P. AND DEPTH

I AM RESPONSIBLE FOR THIS REPORT. THE INFORMATION IS COMPLETE AND CORRECT.

DATE 2/15/84	NAME AND TITLE (PRINT) William E. Booker, Geologist	8-17	SIGNATURE <i>William E. Booker</i>
-----------------	--	------	---------------------------------------

GEO IICAL SURVEY DIVISION  
WELL PLUGGING RECORD

(Submit in TRIPLICATE Within 30 Days After Plugging is Completed)

PERMIT NUMBER	36600
FIELD NAME	

COMPLETE NAME(S) AND ADDRESS OF WELL OWNER PPG Oil & Gas Co., Inc., 2258 Enterprise Drive, Mt. Pleasant, MI 48858			
COMPLETE LEASE OR FARM NAME(S) Thomas			WELL NUMBER <del>1-36</del> 1-26
WELL LOCATION NE ¼ NW ¼ NW ¼ SEC. 26 T. 17N R. 9W		TOWNSHIP Hersey	COUNTY Osceola
TYPE OF WELL (Oil, Gas, Dry Hole, etc.) Temporarily Abandoned		TOTAL DEPTH 8091	FORMATION Cabot Head
DATE PLUGGING STARTED 1-7-84	DATE PLUGGING COMPLETED 1-8-84	DEPT. REPRESENTATIVE(S) WHO ISSUED PERMIT OR WITNESSED PLUGGING Moss	

CASING RECORD			
SIZE CASING	DEPTH SET	AMOUNT RECOVERED	SHOT OR RIPPED
20"	68	----	----
13 3/8"	898	----	----
9 5/8"	5417	----	----

BRIDGES OR PLUGS		
TYPE (Brush, Stone, Cement, Mechanical, etc.)	DEPTH PLACED	SACKS OF CEMENT AND ADDITIVES
Cement	8085	200 sx C1 A
Baker Bridge Plug	5365	----

Were tools, tubing, casing, etc., lost or left in the hole before or during plugging? <div style="text-align: right;"><input type="checkbox"/> YES <input checked="" type="checkbox"/> NO</div>	If yes, give details: <hr/>
Did a Service Company pump mud, spot cement, or set bridge plugs? <div style="text-align: right;"><input checked="" type="checkbox"/> YES <input type="checkbox"/> NO</div>	If yes, give name and address: Halliburton
Was the well plugged by a Company or Contractor other than Owner or Operator? <div style="text-align: right;"><input type="checkbox"/> YES <input checked="" type="checkbox"/> NO</div>	If yes, give name and address: <hr/>
Representatives of Owner, Operator, Company, or Contractor who witnessed plugging: <u>Carl Cookingham</u>	

DESCRIBE IN DETAIL HOW WELL WAS PLUGGED  
Ran in open ended to 8085 and spotted 200 sx Class A, tripped out and ran back in with Baker bridge plug to 5365 - set bridge plug, tripped out and welded steel plate on top. Temporarily abandoned.

(USE REVERSE SIDE IF NEEDED)

CERTIFICATION	
"I state that I am authorized by said Owner or Operator to make this report; and that this report was prepared under my supervision and direction, and that the facts stated herein are true, correct and complete to the best of my knowledge."	
NAME AND TITLE (Typed or Printed) William E. Booker, Geologist	COMPANY NAME AND ADDRESS Strickler Geological Services, Inc. 1425 S. Mission Mt. Pleasant, MI 48858
SIGNATURE 	DATE (Month, Day, Year) 2/15/84 B-18

MINERAL WELL COMPLETION REPORT  
TO BE FILED WITH THE SUPERVISOR WITHIN 60 DAYS  
AFTER COMPLETION OF WELL (ACT 315, P.A. 1969)

SUBMIT IN  
TRIPPLICATE

NAME OF OWNER OR OPERATOR PPG Oil & Gas Co., Inc.		ADDRESS OF OWNER OR OPERATOR 2258 Enterprise Drive Mt. Pleasant, MI 48858	
NAME OF DRILLING CONTRACTOR T. D. Provins Drilling Co.		ADDRESS OF DRILLING CONTRACTOR 2113 Enterprise Drive Mt. Pleasant, MI 48858	
WELL NAME Thomas	WELL NUMBER 1-26A	PERMIT NUMBER 020-841-367	
LOCATION Surface: NE NW NW Subsurface: SW NW NW	SECTION 26	TWP. 17N	RANGE 9W
TOWNSHIP Hersey	COUNTY Osceola		
FODTAGE 460 Ft. from North Line and 864 Ft. from West Line of quarter section N or S E or W			
DATE DRILLING COMMENCED 4-29-84	DATE DRILLING COMPLETED 5-14-84	DATE WELL COMPLETED 5-15-84	TYPE OF WELL Test D & A
FORMATION COMPLETED IN Niagaran	TOTAL DEPTH 8409	ELEVATION KB 1138	RB RT RF 1137 GN 1121
ROTARY TOOLS From 0 Feet to 8388 Feet		CABLE TOOLS From Feet to Feet	

WELL CASING RECORD

TUBING AND CASING DATA				CEMENTING DATA			PERFORATIONS OR OPEN HOLE		
SIZE	LB./FT.	GRADE	DEPTH	SACKS	TYPE	STAGING DEPTH(S)	NO. HOLES	FROM	TO
20"			68	D.P.					
13 3/8		K-55	896	700					
9 5/8		N-80	5417	1700					

WATER ZONES

WIRE LINE LOGS RUN

FORMATION	FROM	TO	AMOUNT	SERVICE COMPANY	TYPE LOG	INTERVAL LOGGED	COPY TO SURVEY
(Fresh)				Schlumberger	LDT-CNL-GR	543 - 8385	Yes

FRACTURE OR ACID TREATMENT

SOLUTION MINING

DATE	FROM	TO	QUANTITY	NAME AND NUMBER OF INJECTION AND TARGET WELL - DISTANCE APART

The information in and attached to this report is complete and correct.

SIGNATURE <i>William E. Bush</i>	TITLE 8-19 Geologist	DATE 5/29/84
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DEPARTMENT OF NATURAL RESOURCES  
GEOLOGICAL SURVEY DIVISION  
**MINERAL WELL PLUGGING RECORD**  
File in DUPLICATE Within 30 Days After Plugging is Completed

PERMIT NUMBER  
020-841-367

DATE  
5-29-84

OWNER OR OPERATOR  
PPG Oil & Gas Co., Inc.

ADDRESS  
2258 Enterprise Drive, Mt. Pleasant, MI 48858

WELL NAME  
Thomas

WELL NUMBER  
1-26A

WELL LOCATION  
NE 1/4 NW 1/4 NW 1/4 SEC. 26 T. 17N R. 9W

TOWNSHIP  
Hersey

COUNTY  
Osceola

TYPE OF WELL (Brine, Disposal, Storage, or Test)  
Test

TOTAL DEPTH  
8409 ~~8388~~

FORMATION  
Niagaran

DATE PLUGGING STARTED  
5-15-84

DATE PLUGGING COMPLETED  
5-15-84

WAS PERMISSION OF DEPT. OF NATURAL RESOURCES  
OBTAINED BEFORE PLUGGING BEGAN? ☒ YES ☐ NO

NAME OF DEPARTMENT REPRESENTATIVE WHO AUTHORIZED OR SUPERVISED PLUGGING  
Snider

CASING SIZE	WHERE SET	AMOUNT RECOVERED	SHOT OR RIPPED	TYPE OF BRIDGES OR PLUGS	DEPTH PLACED	NUM SAC
20"	68	-----		Cement	8409-8230	5
13 3/8	896	-----		Cement	8230-5915	52
9 5/8	5417	-----		Cement kick plug	5915	25

DESCRIBE IN DETAIL HOW WELL WAS PLUGGED

Ran drill pipe to 8409 and spotted 50 sx and pulled up to 8230 and spotted 524 sx,  
pulled up to 5915 and spotted 250 sx, kick off plug.

(USE REVERSE SIDE IF NEEDED)

Were tools, tubing, casing, etc., lost or left  
in the hole before or during plugging?

☐ YES ☒ NO

If yes, give details:

Did a Service Company pump mud,  
spot cement, or set bridge plugs?

☒ YES ☐ NO

If yes, give name and address:  
Halliburton

Was the well plugged by a Company or  
Contractor other than Owner or Operator?

☐ YES ☒ NO

If yes, give name and address:

Representatives of Owner, Operator, Company, or Contractor who witnessed plugging  
Marvin Woods

CERTIFICATE

I, William E. Booker of Strickler Geological Services, Inc. (company)  
state that I am authorized by said Owner or Operator to make this report; and that this report was prepared under my supervision and direction and that the facts stated herein are true, correct and complete to the best of my knowledge.

SIGNATURE  
William E. Booker

ADDRESS  
425 S. Mission, Mt. Pleasant, MI

TITLE  
Geologist

FINAL INSPECTIONS

DEPARTMENT REPRESENTATIVE

DATE

DEPARTMENT REPRESENTATIVE

DATE

B-20



MINERAL WELL COMPLETION REPORT  
TO BE FILED WITH THE SUPERVISOR WITHIN 60 DAYS  
AFTER COMPLETION OF WELL (ACT 315, P.A. 1969)

SUBMIT IN  
TRIPLICATE

NAME OF OWNER OR OPERATOR  PPG Oil & Gas Co., Inc.		ADDRESS OF OWNER OR OPERATOR  2258 Enterprise Drive Mt. Pleasant, MI 48858	
NAME OF DRILLING CONTRACTOR  T. D. Provins Drilling Co.		ADDRESS OF DRILLING CONTRACTOR  2113 Enterprise Drive Mt. Pleasant, MI 48858	
WELL NAME  Thomas		WELL NUMBER  1-26B	PERMIT NUMBER  021-841-367
LOCATION Surf: NE NW NW BHL: SWSE SW (Section 23)		SECTION  26	TWP.  17N RANGE  9W
TOWNSHIP  Hersey		COUNTY  Osceola	
FOOTAGE 460 Ft. from North Line and 864 Ft. from West Line of quarter section N or S E or W			
DATE DRILLING COMMENCED  5-15-84	DATE DRILLING COMPLETED  5-24-84	DATE WELL COMPLETED  5-16-84	TYPE OF WELL  Test - D & A
FORMATION COMPLETED IN  Niagaran	TOTAL DEPTH 8376 <del>8456 MD 7822 TVD</del>	ELEVATION KB  1138	RB  RT  RF 1137 GN 1121
ROTARY TOOLS From 0 Feet to 8356 Feet		CABLE TOOLS From Feet to Feet	

WELL CASING RECORD

TUBING AND CASING DATA				CEMENTING DATA			PERFORATIONS OR OPEN HOLE		
SIZE	LB/FT.	GRADE	DEPTH	SACKS	TYPE	STAGING DEPTH(S)	NO HOLES	FROM	TO
20"			68	D.P.					
13 3/8"		K-55	896	700					
9 5/8"		N-80	5417	1700					

WATER ZONES

WIRE LINE LOGS RUN

FORMATION	FROM	TO	AMOUNT	SERVICE COMPANY	TYPE LOG	INTERVAL LOGGED	COPY TO SURVEY
(Fresh)				Schlumberger	LDT-CNL-GR	5400 - 8376	Yes

FRACTURE OR ACID TREATMENT

SOLUTION MINING

DATE	FROM	TO	QUANTITY	NAME AND NUMBER OF INJECTION AND TARGET WELL - DISTANCE APART

The information in and attached to this report is complete and correct.

SIGNATURE <i>William E. Book</i>	TITLE B-21 Geologist	DATE 6/29/84
-------------------------------------	-------------------------	-----------------

GIVE COMPLETE FORMATION RECORD ON REVERSE SIDE

STATE OF MICHIGAN  
DEPARTMENT OF NATURAL RESOURCES  
GEOLOGICAL SURVEY DIVISION

MINERAL WELL PLUGGING RECORD

File in DUPLICATE Within 30 Days After Plugging is Completed

PERMIT NUMBER

021-841-367

DATE

6/29/84

OWNER OR OPERATOR

PPG Oil & Gas Co., Inc.

ADDRESS

2258 Enterprise Drive, Mt. Pleasant, MI 48858

WELL NAME

Thomas

WELL NUMBER

1-26B

WELL LOCATION

NE 1/4 NW 1/4 NW 1/4 SEC. 26 T. 17N R. 9W

TOWNSHIP

Hersey

COUNTY

Osceola

TYPE OF WELL (Brine, Disposal, Storage, or Test)

Test

TOTAL DEPTH

8376

FORMATION

Niagaran

DATE PLUGGING STARTED

5-26-84

DATE PLUGGING COMPLETED

5-26-84

WAS PERMISSION OF DEPT. OF NATURAL RESOURCES  
OBTAINED BEFORE PLUGGING BEGAN?

☒ YES

☐ NO

NAME OF DEPARTMENT REPRESENTATIVE WHO AUTHORIZED OR SUPERVISED PLUGGING

Snider

CASING SIZE	WHERE SET	AMOUNT RECOVERED	SHOT OR RIPPED	TYPE OF BRIDGES OR PLUGS	DEPTH PLACED	NUMBER SAC
20"	68	-----		Cement	8376	10
13 3/8"	896	-----		Cement	8000	81
9 5/8	5417	-----		Cement	5450	26
				Cement	4700	39
				Cement	1400	10

DESCRIBE IN DETAIL HOW WELL WAS PLUGGED

Ran drill pipe open ended to 8376' and spotted 100 sx, pulled drill pipe to 8000  
and spotted 260 sx, pulled drill pipe to 4700 and spotted 390 sx, pulled drill pipe  
to 1400 and spotted 100 sx, cut and capped.

(USE REVERSE SIDE IF NEEDED)

Were tools, tubing, casing, etc., lost or left  
in the hole before or during plugging?

☐ YES

☒ NO

If yes, give details:

Did a Service Company pump mud,  
spot cement, or set bridge plugs?

☒ YES

☐ NO

If yes, give name and address:

Halliburton

Was the well plugged by a Company or  
Contractor other than Owner or Operator?

☐ YES

☒ NO

If yes, give name and address:

Representatives of Owner, Operator, Company, or Contractor who witnessed plugging

Marvin Woods

CERTIFICATE

I, William E. Bodker of Strickler Geological Services, Inc. (company  
state that I am authorized by said Owner or Operator to make this report; and that this report was prepared under my supervision and direct  
and that the facts stated herein are true, correct and complete to the best of my knowledge.

SIGNATURE

*William E. Bodker*

ADDRESS

1425 S. Mission, Mt. Pleasant, MI

TITLE

Geologist

FINAL INSPECTIONS

DEPARTMENT REPRESENTATIVE

DATE

DEPARTMENT REPRESENTATIVE

DATE

B-22

DEPARTMENT OF NATURAL RESOURCES  
LOG OF OIL, GAS, DISPOSAL OR STORAGE WELL (ACT 61)  
Submit in DUPLICATE Within 30 Days after Well Completion

36942  
DEEPENING PERMIT NUMBER

NAME(S) & ADDRESS OF OWNER(S) SHOWN ON PERMIT PPG Oil & Gas Co., Inc. 2258 Enterprise Drive Mt. Pleasant, MI 48858				NAME & ADDRESS OF DRILLING CONTRACTOR(S) Bigard Drilling Company 1315 S. Mission Mt. Pleasant, MI 48858			
LEASE NAME(S) & WELL NUMBER SHOWN ON PERMIT Woodward #1-26						DIRECTIONALLY DRILLED YES <input type="checkbox"/> NO <input checked="" type="checkbox"/>	
SURFACE LOCATION NW NE SW		SECTION 26	TOWNSHIP 17N	RANGE 9W	TOWNSHIP NAME Hersey		
FOOTAGES (North/South) 460 Ft. from North		Line and 667		(East/West) Ft. from East		Line of quarter section COUNTY NAME Osceola	
SUBSURFACE LOCATION		SECTION	TOWNSHIP	RANGE	TOWNSHIP NAME		
FOOTAGES (North/South)		Line and		(East/West) Ft. from		Line of quarter section COUNTY NAME	
DATE	DRILLING BEGUN 10-11-83		TOTAL DEPTH OF WELL Driller 8135 Log 8140		TYPE WELL Dry Hole		ELEVATIONS
	DRILLING COMPLETED 10-31-83		FORMATION AT T.D. Cabot Head		FT. DRLD. - ROTARY TOOLS From 0 To 8140		
	WELL COMPLETED		PRODUCING FORMATION(S) None		FT. DRLD. - CABLE TOOLS From To		
					K.B. 1191.7	R.F. 1190.3	
					R.T.	Grd. 1175.2	

CASING, CASING LINERS AND CEMENTING

PERFORATIONS

SIZE	WHERE SET	CEMENT	Ft. Pulled	DATE	NUMBER HOLES	INTERVAL PERFORATED	OPEN	
20"	77	D.P.	---				YES	NO
11 3/4	931	575 Sx	---			None		
8 5/8	5456	1600 Sx	---					

GROSS PAY INTERVALS

ALL OTHER OIL AND GAS SHOWS OBSERVED OR LOGGED

FORMATION	OIL OR GAS	FROM	TO	FORMATION	OIL OR GAS	DEPTH	WHERE OBSERVED (X)					
None							Sam- ples	Odor	Pits	Mud Line	Gas Log	Fill Up
				Reed City Dol	Gas	4100					X	
				Sour	Gas	4650					X	
				A2 Carbonate	Gas	6995			X		X	

STIMULATION BY ACID OR FRACTURING

WATER FILL UP (F.U.) OR LOST CIRCULATION (L.C.) (X)

DATE	Interval Treated	Materials and amount used	FORMATION	F.U.	L.C.	DEPTH	AMOUNT
	None		None				

MECHANICAL LOGS, LIST EACH TYPE RUN

DEPTH CORRECTION DEVIATION SURVEY PLUGGED BACK

Brand	(X)	LOG TYPES	LOGGED INTERVALS	DEPTH	CORRECTN	RUN AT	DEGREES	YES	NO	DEPTH
Schlumberger	X	LDT-CNL-GR	200-8135			2450	1°			
Birdwell		Dual Micro	3100-8135			4400	3/4°			
		Sonic	200-8135			6493	3/4°			
						7100	1 3/4°			

PRODUCTION TEST DATA

OIL - Bbls/day	GRAVITY - °API	COND. Bbls/day	GAS - MCF/day	WATER - Bbls/day	H <sub>2</sub> S - Grains/100 cu. ft.	B.H.P. AND DEPTH

I AM RESPONSIBLE FOR THIS REPORT. THE INFORMATION IS COMPLETE AND CORRECT.

DATE 11-18-83	NAME AND TITLE (PRINT) William E. Booker, Geologist 8-23	SIGNATURE <i>William E. Booker</i>
------------------	---	---------------------------------------

DEPARTMENT OF NATURAL RESOURCES  
GEOLOGICAL SURVEY DIVISION

WELL PLUGGING RECORD

(Submit in TRIPLICATE Within 30 Days After Plugging is Completed)

PERMIT NUMBER

36942

FIELD NAME

COMPLETE NAME(S) AND ADDRESS OF WELL OWNER

PPG Oil & Gas Co., Inc., 2258 Enterprise Drive, Mt. Pleasant, MI 48858

COMPLETE LEASE OR FARM NAME(S)

Woodward

WELL NUMBER

1-26

WELL LOCATION

NW ¼

NE ¼

SW¼ SEC. 26

T. 17N

R. 9W

TOWNSHIP

Hersey

COUNTY

Osceola

TYPE OF WELL (Oil, Gas, Dry Hole, etc.)

Dry Hole

TOTAL DEPTH

8135

FORMATION

Cabot Head

DATE PLUGGING STARTED

10-31-83

DATE PLUGGING COMPLETED

11-1-83

DEPT. REPRESENTATIVE(S) WHO ISSUED PERMIT OR WITNESSED PLUGGING

Jack Snider

CASING RECORD

SIZE CASING	DEPTH SET	AMOUNT RECOVERED	SHOT OR RIPPED
20"	77	---	
11 3/4"	931	---	
8 5/8"	5456	---	

BRIDGES OR PLUGS

TYPE (Brush, Stone, Cement, Mechanical, etc.)	DEPTH PLACED	SACKS OF CEMENT AND ADDITIVES
Cement	7800-8140	100 Sx
Cement	7000-7800	195 Sx
Cement	6800-7000	75 Sx
Cement	5460-6800	400 Sx
Cement	5060-5460	100 Sx
Cement	500-5060	900 Sx
Cement	0-500	150 Sx

Were tools, tubing, casing, etc., lost or left in the hole before or during plugging?

☐ YES ☒ NO

If yes, give details:

Did a Service Company pump mud, spot cement, or set bridge plugs?

☒ YES ☐ NO

If yes, give name and address:

Halliburton

Was the well plugged by a Company or Contractor other than Owner or Operator?

☐ YES ☒ NO

If yes, give name and address:

Representatives of Owner, Operator, Company, or Contractor who witnessed plugging:

Willie Masterson

DESCRIBE IN DETAIL HOW WELL WAS PLUGGED

Ran open ended drill pip to 8140' and spotted 100 sx to 7800'. Pulled drill pipe to 7800' and spotted 195 sx to 7000', pulled drill pipe to 7000' and spotted 75 sx to 6800', pulled drill pipe to 6800' and spotted 400 sx to 5410', pulled drill pipe to 5460' and spotted 100 sx to 5060' pulled drill pipe to 5060' and spotted 900 sx to 500, pulled drill pipe to 500' and spotted 150 sx to surface.

(USE REVERSE SIDE IF NEEDED)

CERTIFICATION

"I state that I am authorized by said Owner or Operator to make this report; and that this report was prepared under my supervision and direction, and that the facts stated herein are true, correct and complete to the best of my knowledge."

NAME AND TITLE (Typed or Printed)

William E. Booker, Geologist

COMPANY NAME AND ADDRESS

STRICKLER GEOLOGICAL SERVICES, INC.

SIGNATURE

*William E. Booker*

DATE (Month, Day, Year)

11-18-83 B-24

1425 S. Mission

Mt. Pleasant, MI 48858



## WELL REWORK RECORD

NAME AND ADDRESS OF PERMITTEE

PPG Industries, Inc.  
2258 Enterprise Drive  
Mt. Pleasant, MI 48858

NAME AND ADDRESS OF CONTRACTOR

Not Selected

LOCATE WELL AND OUTLINE UNIT ON  
SECTION PLAT — 640 ACRESSTATE  
MICOUNTY  
Osceola

PERMIT NUMBER

SURFACE LOCATION DESCRIPTION

NW 1/4 OF NE 1/4 OF SW 1/4 SECTION 26 TOWNSHIP 17N RANGE 9W

LOCATE WELL IN TWO DIRECTIONS FROM NEAREST LINES OF QUARTER SECTION AND DRILLING UNIT

Surface  
Location 460 ft. from (N/S) N Line of quarter section  
and 667 ft. from (E/W) E Line of quarter section

WELL ACTIVITY

- ☒
- Brine Disposal
- 
- ☐
- Enhanced Recovery
- 
- ☐
- Hydrocarbon Storage

Lease Name

Woodward

Total Depth Before Rework

8140'

Total Depth After Rework

approx. 4200'

Date Rework Commenced

Date Rework Completed

TYPE OF PERMIT

☒ Individual☐ Area

Number of Wells 1

Well Number

1-26

## WELL CASING RECORD — BEFORE REWORK

Casing		Cement		Perforations		Acid or Fracture Treatment Record
Size	Depth	Sacks	Type	From	To	
20"	77'					
11 3/4"	931'	575	HOWCO lite			
8 5/8"	5,456'	1,600	HOWCO lite			

## WELL CASING RECORD — AFTER REWORK (Indicate Additions and Changes Only)

Casing		Cement		Perforations		Acid or Fracture Treatment Record	
Size	Depth	Sacks	Type	From	To		
Permanent Bridge Plug 4,200'							
8 5/8" x 4" packer set at ± 3800'							
4 1/2" K-55 11.6# to surface							

DESCRIBE REWORK OPERATIONS IN DETAIL  
USE ADDITIONAL SHEETS IF NECESSARY

WIRE LINE LOGS, LIST EACH TYPE

Log Types	Logged Intervals
LDT-CNL-GR	200-8135'
Dual Micro	3100-8135'
Sonic	200-8135'

## CERTIFICATION

I certify under the penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment. (Ref. 40 CFR 144.32).

NAME AND OFFICIAL TITLE (Please type or print)

R. D. Duncan  
Group V.P. Chemicals

SIGNATURE

DATE SIGNED

2/15/80

NOV 29 1983

SEP 15 1983 WELL PLUGGING RECORD

(Submit in TRIPLICATE Within 30 Days After Plugging is Completed)

PERMIT NUMBER

36942

DEC 02 1983

FIELD NAME

# Permits & Bonding Unit

COMPLETE NAME(S) AND ADDRESS OF WELL OWNER

PPG Oil & Gas Co., Inc., 2258 Enterprise Drive, Mt. Pleasant, MI 48858

COMPLETE LEASE OR FARM NAME(S)

Woodward

WELL NUMBER

1-26

WELL LOCATION

NW ¼ NE ¼ SW ¼ SEC. 26 T. 17N R. 9W

TOWNSHIP

Harsey

COUNTY

Oscoda

TYPE OF WELL (Oil, Gas, Dry Hole, etc.)

Dry Hole

TOTAL DEPTH

8135

FORMATION

Cabot Head

DATE PLUGGING STARTED

10-31-83

DATE PLUGGING COMPLETED

11-1-83

DEPT. REPRESENTATIVE(S) WHO ISSUED PERMIT OR WITNESSED PLUGGING

Jack Snider

## CASING RECORD

SIZE CASING	DEPTH SET	AMOUNT RECOVERED	SHOT OR RIPPED
20"	77	---	
11 3/4"	931	---	
8 5/8"	5456	---	

## BRIDGES OR PLUGS

TYPE (Brush, Stone, Cement, Mechanical, etc.)	DEPTH PLACED	SACKS OF CEMENT AND ADDITIVES
Cement	7800-8140	100 Sx
Cement	7000-7800	195 Sx
Cement	6800-7000	75 Sx
Cement	5460-6800	400 Sx
Cement	5060-5460	100 Sx
Cement	500-5060	900 Sx
Cement	0-500	150 Sx

Were tools, tubing, casing, etc., lost or left in the hole before or during plugging?

☐ YES ☒ NO

If yes, give details:

Did a Service Company pump mud, spot cement, or set bridge plugs?

☒ YES ☐ NO

If yes, give name and address:

Halliburton

Was the well plugged by a Company or Contractor other than Owner or Operator?

☐ YES ☒ NO

If yes, give name and address:

Representatives of Owner, Operator, Company, or Contractor who witnessed plugging:

Willie Masterson

## DESCRIBE IN DETAIL HOW WELL WAS PLUGGED

Ran open ended drill pipe to 8140' and spotted 100 sx to 7800'. Pulled drill pipe to 7800' and spotted 195 sx to 7000'. pulled drill pipe to 7000' and spotted 75 sx to 6800', pulled drill pipe to 6800' and spotted 400 sx to 5410'. pulled drill pipe to 5460' and spotted 100 sx to 5060' pulled drill pipe to 5060' and spotted 900 sx to 500. pulled drill pipe to 500' and spotted 150 sx to surface.

(USE REVERSE SIDE IF NEEDED)

## CERTIFICATION

"I state that I am authorized by said Owner or Operator to make this report; and that this report was prepared under my supervision and direction, and that the facts stated herein are true, correct and complete to the best of my knowledge."

NAME AND TITLE (Typed or Printed)

William E. Booker, Geologist

SIGNATURE

*William E. Booker*

DATE (Month, Day, Year)

11-18-83

COMPANY NAME AND ADDRESS

STRICKLER GEOLOGICAL SERVICES, INC.

1425 S. Mission

Mt. Pleasant, MI 48858

Description of Detail (cont.) or Other Supplemental Data

DEPARTMENT USE ONLY

Supplemental Plugging Data and Site Conditions

Well was re-entered and converted to an Act 315 displ. well. MW Permit #349-855-867. H Moss

FINAL INSPECTIONS BY DEPARTMENT REPRESENTATIVES

SIGNATURE

DIVISION

DATE

Michael J. Moss

GEOLOGICAL SURVEY

9/11/87



PPG INDUSTRIES, INC. BOREHOLE COMPLETION DATA

WORKOVER INFORMATION

WELL Woodward 1-26

Page 1

Date	Description
6-6-85	Moved Lease Management Workover Rig #129 onto location. Rigged up, put well head on and shut down for night.
6-7-85	Picked up 2 - 6" D.C. 7-7/8" J-44c Serical #HJ075, started drilling out cement. Drilled to approximately 300', cement very hard at surface. Worked till 20:00 hrs. and shut down for weekend.
6-10-85	Drilled cement to approximately 800', then dropped thru to approximately 1200', then cement again. Drilled to approximately 1420' and shut down for nite.
6-11-85	Drilling hard cement again. Drilling 55 min./30'. Drilled to 1875' by 20:00 hrs. Shut down for nite.
6-12-85	Drilled cement to depth of 2250', still very hard cement. Shut down for nite.
6-13-85	Drilled cement to depth of 2750', still drilling hard.
6-14-85	Drilled cement out to depth of 3250', still drilling hard.
6-15-85	Drilled till noon. Drilled to 3750', still good hard cement. Shut down till Monday.
6-17-85	Finished drilling cement. Drilled to approx. 4250'. Cement still very compacted.
6-18-85	TOH standing, PU casing scraper and ran back to bottom. Drilled to 4270.57' TOH, LD bit and two 6" collars. PU Baker permanent type bridge plug and ran in to set as close to bottom as possible. Set bridge plug at 4260'. Pulled out of bridge plug and shut down for night.
6-19-85	Displaced hole with clean fresh water. TOH standing. RU McCullough to log. McCullough ran Gamma/Neutron log with CCL and Cement Bond log. Free pipe showed thru Reed City Dolomite, also showed some gas at top of free pipe from 3500'-3595'. Free pipe from TD to DV tool at 3495'. Shut down for night.
6-20-85	Perf'd 8-5/8" casing at 4261' and 3503' with 4 holes each place. Ran in and set cement retainer at 4237' KB. RU Halliburton and circulated gas out of hole. String into retainer and circulated between lower and upper perfs. Max. pressure 2000 psi. Blended 200 sks Class A cement, 2% CaCl, and water loss agent. Pumped cement away and displaced tubing. NOTE: lost 6 bbls of fluid to formation thru upper perfs while blending cement. TOH standing and shut down for the night.

WORKOVER INFORMATIONWELL Woodward 1-26Page 2

Date	Description
6-21-85	PU 7-7/8" rerun bit J-44, Serial #HX352, casing scraper and TIH. Tagged cement retainer. No indication of cement. Circulated hole with 240 bbls H2O. Lost approx. 20 bbls to formation. TOH standing. RU McCullough to rerun Cement Bond Log from TD - 3500'. Log still shows free pipe, no sign of any cement. PU stinger from cement retainer and run to bottom. RU Halliburton to pump down tubing to see if bottom perfs are still open. Broke circulation with 1200 psi as compared to 1800 psi yesterday. Put dye in 30 bbls of H2O, started pumping to tally volume of annulus plus void. Return turned to brine after 30 bbls of pumping and became very foamy. Got our dye water back and decided we were not stung in. Tried to sting in, could not. POH and shut down. Decided to perf 8-5/8" casing again with 4 holes right above cement retainer, run second retainer and squeeze again.
6-22-85	RU McCullough and perfed 4 holes at 4253' KB. PU Baker cement retainer. Started in to set at 4240'. Set cement retainer approx. 8' above perfs at 4247' KB, confirmed by wireline. RU Halliburton. Broke circulation with 1200 psi at 4 bbl/min, annulus was down 11 bbl. String into retainer. Broke circulation behind casing immediately, 1400 psi at 4 bbls/min. Mixed dye in 30 bbl and pumped 308 bbls before retrieving to surface. Started pumping at 10:34 a.m. Drilled out more cement. Mixed and pumped 300 sks Class A 2% CaCl with 3/4% Halide 322 and 150 sks of Thix-O-Tropic. Finished cementing 16:30, POH. Fourteen stands wet then dried up. Shut down til Monday a.m.
6-24-85	RU McCullough, ran Single Bore CCL. Tagged cement retainer at 4247'. Ran cement bond logging tool. Found good bond at bottom. Top of cement up to 3850'. Will have to squeeze cement from 3502'-3850'. Ordered out Baker cement retainer to set at approx. 3440'. Ordered out 270 sks neat cement to squeeze with. Strapped drill pipe into hole and set CR at 3457.00'. RU Halliburton for flow test. Pumped 2 bbl/min at 2000 psi, pressure dropped to 1600 psi. Mixed 300 sks neat cement and squeezed into perfs. Displaced drill pipe and cement retainer. Left some cement in casing. Ended squeeze with 2000 psi on cement. Stung out of CR and TOH. Shut down for the day.
6-25-85	Drilled out cement retainer and cement below. Ran in and tagged lower cement

## WORKOVER INFORMATION

WELL Woodward 1-26

Page 3

Date	Description
6-25-85	CONTINUED.....
	retainer at 4247'. Tripped out standing and installed upper tree and rigged Halliburton to do casing integrity test. Pressured casing to 3000 psi. Surface pressure held pressure for 20 min. No leak off; released pressure and shut down for the night.
6-26-85	Removed upper tree section, installed flow nipple, picked up casing scraper, two 6" drill collars, one 4-3/4" drill collar and tubing; ran in and tagged cement retainer at 4247'. Circulated hole. Changed hole over to clean fresh water. Tripped out of hole standing and laid down 4-3/4" and 6" drill collars. Tripped back in hole with open-ended tubing to 4160' KB. Ready to spot acid. Shut down til Monday, July 1, 1985. *
7-1-85	Rigged up Halliburton & spotted 750 gallons, 20% HCl acid from 4150 up across perf interval. Pulled 2-7/8" tubing from hole laying down. Rigged up McCullough to perf from 3995'-4144'; total of 82 holes (see log for intervals). Finished perforating and rigged down. Installed upper tree section and wait on Halliburton. Rigged Halliburton to do pump test. Tested lines to 300 psi and started to pump. No flow at 500 psi. Perfs taking some flow, but very tight. Achieved 22 bbl/min at 2900 psi. Shut down for line leak and decided to stay down for the night. Ordered 8000 gallons 20% HCl to be on location for 0700 pumping. Will treat with 8000 gallons of acid and 120 perf balls 1.4 SP gravity
7-2-85	Acid arrived 0600. Rigged acid trucks and tested lines for leaks. Repaired leaks in lines and wellhead. Pumped acid at rate of 15 bbl/min, dropped 120 bbls then displaced with 2% KCl water. Got good balling action. Rigged down upper tree section and picked up bit casing scraper and ran in to TD to remove balls from perfs. Tripped out standing and put on upper tree section. Rigged Halliburton to do second pump test. Good pump test, max. flow 27 bbl/min at 2570 psi. Could not pump any more with available horsepower. Rigged down Halliburton and shut down for the night.
7-3-85	Removed upper tree section and ran tubing into hole. Tripped out laying down. Picked up 4 1/2" casing tail pipe, 8-5/8" lok-set Baker packer and 4 1/2" casing and ran in; set packer at 3900'. Landed in donut and installed upper tree



STATE OF MICHIGAN  
DEPARTMENT OF NATURAL RESOURCES  
**LOG OF OIL, GAS, DISPOSAL OR STORAGE WELL (ACT 61)**  
Submit in DUPLICATE Within 30 Days after Well Completion

WELL NUMBER <b>37317</b>
DEEPENING PERMIT NUMBER

NAME(S) & ADDRESS OF OWNER(S) SHOWN ON PERMIT PPG Oil & Gas Co., Inc. 2258 Enterprise Drive Mt. Pleasant, MI 48858				NAME & ADDRESS OF DRILLING CONTRACTOR(S) T. D. Provins Drilling Co. 2113 Enterprise Drive Mt. Pleasant, MI 48858			
LEASE NAME(S) & WELL NUMBER SHOWN ON PERMIT Paine #1-26						DIRECTIONALLY DRILLED YES <input type="checkbox"/> NO <input checked="" type="checkbox"/>	
SURFACE LOCATION SE NE SE		SECTION 26	TOWNSHIP 17N	RANGE 9W	TOWNSHIP NAME Hersey		
FOOTAGES (North/South) 822 Ft. from North		Line and 560		FOOTAGES (East/West) Ft. from East		COUNTY NAME Osceola	
SUBSURFACE LOCATION		SECTION	TOWNSHIP	RANGE	TOWNSHIP NAME		
FOOTAGES (North/South)		Line and		FOOTAGES (East/West)		COUNTY NAME	
Ft. from		Ft. from		Line of quarter section			
DATE	DRILLING BEGUN 1-5-84		TOTAL DEPTH OF WELL Driller 8095 Log 8098		TYPE WELL Gas		ELEVATIONS
	DRILLING COMPLETED 2-14-84		FORMATION AT T.D. Cabot Head		FT. DRD. - ROTARY TOOLS From 0 To 8098		
	WELL COMPLETED		PRODUCING FORMATION(S)		FT. DRD. - CABLE TOOLS From To		
					K.B. 1140	R.F. 1139	
					R.T.	Grd.	1124

CASING, CASING LINERS AND CEMENTING

PERFORATIONS

SIZE	WHERE SET	CEMENT	Ft. Pulled	DATE	NUMBER HOLES	INTERVAL PERFORATED	OPEN	
20"	72	D.P.	---				YES	NO
16"	625	550 sx	---	5-18-84	2x/ft.	8026 - 8045	XX	
11 3/4"	911	370 sx	---					
8 5/8"	5408	1400 sx	---					
5 1/2"	8090	885 sx	---					

GROSS PAY INTERVALS

ALL OTHER OIL AND GAS SHOWS OBSERVED OR LOGGED

FORMATION	OIL OR GAS	FROM	TO	FORMATION	OIL OR GAS	DEPTH	WHERE OBSERVED (X)					
Burnt Bluff	Gas	8024	8046	Antrim	Gas	3000	Sam- ples	Odor	Pits	Mud Line	Gas Log	Fill Up
				Sour Zone	Gas	4620				XX		
										XX		

STIMULATION BY ACID OR FRACTURING

WATER FILL UP (F.U.) OR LOST CIRCULATION (L.C.) (X)

DATE	Interval Treated	Materials and amount used	FORMATION	F.U.	L.C.	DEPTH	AMOUNT
5-18-84	8026-45	500 gal. Fe Acid					

MECHANICAL LOGS, LIST EACH TYPE RUN

DEPTH CORRECTION DEVIATION SURVEY PLUGGED BACK

Brand	(X)	LOG TYPES	LOGGED INTERVALS	DEPTH	CORRECT'N	RUN AT	DEGREES	YES	NO	DEPTH
Schlumberger	X	LDT-CNL-GR	100 - 8098			1900	3/4°			
Birdwell		Dual-Micro	3250 - 5397			4270	1/2°			
			6900 - 8098			6050	2°			
		BHC Sonic	6400 - 8098			7440	1/2°			

PRODUCTION TEST DATA

OIL - Bbls/day	GRAVITY - °API	COND. Bbls/day	GAS - MCF/day	WATER - Bbls/day	H <sub>2</sub> S - Grains/100 cu. ft.	B.H.P. AND DEPTH
			1 MMCF			

I AM RESPONSIBLE FOR THIS REPORT. THE INFORMATION IS COMPLETE AND CORRECT.

DATE 5/29/84	NAME AND TITLE (PRINT) William E. Booker, Geologist B-25	SIGNATURE <i>William E. Booker</i>
-----------------	---	---------------------------------------

NOTICE REPORT COMPLETE SAMPLE AND FORMATION RECORD AND DRILL STEM TEST INFORMATION ON REVERSE SIDE

R - 7210  
Rev. 3/77

STATE OF MICHIGAN  
DEPARTMENT OF NATURAL RESOURCES  
LOG OF OIL, GAS, DISSAL OR STORAGE WELL (ACT 61)  
Submit in DUPLICATE Within 30 Days after Well Completion

PERMIT NUMBER 37519
DEEPENING PERMIT NUMBER

NAME(S) & ADDRESS OF OWNER(S) SHOWN ON PERMIT PPG OIL & GAS, INC. 2258 Enterprise Drive Mt. Pleasant, MI 48858				NAME & ADDRESS OF DRILLING CONTRACTOR(S) INDRIL, INC. PO Box 668 Mt. Pleasant, MI 48858				
LEASE NAME(S) & WELL NUMBER SHOWN ON PERMIT MILLER #1-25							DIRECTIONALLY DRILLED YES <input checked="" type="checkbox"/> NO <input type="checkbox"/>	
SURFACE LOCATION SE NE SE		SECTION 26	TOWNSHIP 17N	RANGE 9W	TOWNSHIP NAME Hersey			
FOOTAGES (North/South) 852 Ft. from North		Line and 560		(East/West) Ft. from East		Line of quarter section	COUNTY NAME Osceola	
SUBSURFACE LOCATION SW NW SW		SECTION 25	TOWNSHIP 17N	RANGE 9W	TOWNSHIP NAME Hersey			
FOOTAGES (North/South) 634 Ft. from South		Line and 558		(East/West) Ft. from West		Line of quarter section	COUNTY NAME Osceola	
DATE	DRILLING BEGUN 7/9/84		TOTAL DEPTH OF WELL Driller 8425 Log 8424		TYPE WELL Gas well		ELEVATIONS	
	DRILLING COMPLETED 8/8/84		FORMATION AT T.D. Cabot Head		FT. DRLD. - ROTARY TOOLS From 0 To 8425			K.B. 1139.7
	WELL COMPLETED 9/1/84		PRODUCING FORMATION(S)		FT. DRLD. - CABLE TOOLS From To			R.T. Grd. 1122.9

CASING, CASING LINERS AND CEMENTING

PERFORATIONS

SIZE	WHERE SET	CEMENT	Ft. Pulled	DATE	NUMBER HOLES	INTERVAL PERFORATED	OPEN	
16"	615'	550 sx	---				YES	NO
11-3/4"	915'	400 sx	---	9/13/84	2/ft	8328-8343 (30x)	X	
8-5/8"	5432'	650 sx 1st stage						

GROSS PAY INTERVALS

ALL OTHER OIL AND GAS SHOWS OBSERVED OR LOGGED

FORMATION	OIL OR GAS	FROM	TO	FORMATION	OIL OR GAS	DEPTH	WHERE OBSERVED (X)					
Burnt Bluff	Gas	8327	8358MD				Sam- ples	Odor	P:is	Mud Line	Gas Log	Full Up
		8050	8075TVD	Reed City	Gas	4075					X	
				Antrim	Gas	3010					X	

STIMULATION BY ACID OR FRACTURING

WATER FILL UP (F.U.) OR LOST CIRCULATION (L.C.) (X)

DATE	Interval Treated	Materials and amount used	FORMATION	F.U.	L.C.	DEPTH	AMOUNT
9/13/84	8328-43	500 gal. 15%	None				

MECHANICAL LOGS, LIST EACH TYPE RUN

DEPTH CORRECTION DEVIATION SURVEY PLUGGED BACK

Brand	(X)	LOG TYPES	LOGGED INTERVALS	DEPTH	CORRECT'N	RUN AT	DEGREES	YES	NO	DEPTH
Schlumberger	X	LDT-CNL-GR	100-8420			See attached				
Birdwell		Sonic	6600-8420							
		DLL-MLL	3150-5429							
			7000-8422							

PRODUCTION TEST DATA

OIL - Bbls/day	GRAVITY - °API	COND. Bbls/day	GAS - MCF/day	WATER - Bbls/day	H <sub>2</sub> S - Grains/100 cu. ft.	B.H.P. AND DEPTH
--	--	--	1,000	--	--	--

I AM RESPONSIBLE FOR THIS REPORT. THE INFORMATION IS COMPLETE AND CORRECT.

DATE 9/20/84	NAME AND TITLE (PRINT) William E. Booker, Geologist	3-26	SIGNATURE <i>William E. Booker</i>
-----------------	--	------	---------------------------------------

NOTICE REPORT COMPLETE SAMPLE AND FORMATION RECORD AND DRILL STEM TEST INFORMATION ON REVERSE SIDE

NAME OF OWNER OR OPERATOR PPG OIL & GAS CO., INC.		ADDRESS OF OWNER OR OPERATOR 2258 Enterprise Drive Mt. Pleasant, MI 48858	
NAME OF DRILLING CONTRACTOR BIGARD DRILLING COMPANY		ADDRESS OF DRILLING CONTRACTOR 1315 S. Mission Mt. Pleasant, MI 48858	
WELL NAME Lutz		WELL NUMBER 1-34	PERMIT NUMBER 005-841-367
LOCATION NW NW NE		SECTION 34	TWP. 17N
TOWNSHIP Hersey		COUNTY Osceola	
FOOTAGE 500 Ft. from North Line and 500 Ft. from West Line of quarter section N or S E or W			
DATE DRILLING COMMENCED 6-28-84	DATE DRILLING COMPLETED 6-23-84	DATE WELL COMPLETED 6-23-84	TYPE OF WELL Abandoned Test
FORMATION COMPLETED IN Niagaran	TOTAL DEPTH 7881	ELEVATION KB 1193.8	RB RT RF GN 1192.2 1176.7
ROTARY TOOLS From 0 Feet to 7881 Feet		CABLE TOOLS From Feet to Feet	

WELL CASING RECORD

TUBING AND CASING DATA				CEMENTING DATA			PERFORATIONS OR OPEN HOLE		
SIZE	LB./FT.	GRADE	DEPTH	SACKS	TYPE	STAGING DEPTH(S)	NO. HOLES	FROM	TO
24"	132	K-55	65	D.P.					
13 3/8"	54.5	H-40	860	950	Com/Cl A				
9 5/8"	43.5	N-80	5430	1. 600/200 Com/Cl A 3670-DV Tool					
				2. 750/100 Com/Cl A					

WATER ZONES

WIRE LINE LOGS RUN

FORMATION	FROM	TO	AMOUNT	SERVICE COMPANY	TYPE LOG	INTERVAL LOGGED	COPY TO SURVEY
(Fresh)				Schlumberger	LDT-CNL-GR	100 - 7881	Yes
None					DIL/MIL	3300 - 4180	Yes

FRACTURE OR ACID TREATMENT

SOLUTION MINING

DATE	FROM	TO	QUANTITY	NAME AND NUMBER OF INJECTION AND TARGET WELL - DISTANCE APART
None				None

The information in and attached to this report is complete and correct.

SIGNATURE <i>William E. Booker</i>	TITLE Geologist B-29	DATE 8/13/84
---------------------------------------	----------------------------	-----------------

GIVE COMPLETE FORMATION RECORD ON REVERSE SIDE



# MINERAL WELL PLUGGING RECORD

File in DUPLICATE Within 30 Days After Plugging is Completed

PERMIT NUMBER

005-841-367

DATE

8/13/84

OWNER OR OPERATOR

PPG Oil & Gas Co., Inc.

ADDRESS

2258 Enterprise Drive, Mt. Pleasant, MI 48858

WELL NAME

Lutz

WELL NUMBER

1-34

WELL LOCATION

NW 1/4 NW 1/4 NE 1/4 SEC. 34 T. 17N R. 9W

TOWNSHIP

Hersey

COUNTY

Osceola

TYPE OF WELL (Brine, Disposal, Storage, or Test)

Abandoned Test Well

TOTAL DEPTH

7881

FORMATION

Niagaran

DATE PLUGGING STARTED

6-23-84

DATE PLUGGING COMPLETED

6-23-84

WAS PERMISSION OF DEPT. OF NATURAL RESOURCES  
OBTAINED BEFORE PLUGGING BEGAN?

☒ YES

☐ NO

NAME OF DEPARTMENT REPRESENTATIVE WHO AUTHORIZED OR SUPERVISED PLUGGING

Jack Snider

CASING SIZE	WHERE SET	AMOUNT RECOVERED	SHOT OR RIPPED	TYPE OF BRIDGES OR PLUGS	DEPTH PLACED	NUMB SACKS
24"	65	None	---	Cement	5900	210
13 3/8"	860	None	---	Cement	6890	280
9 5/8"	5430	None	---	Cement	7860	265

DESCRIBE IN DETAIL HOW WELL WAS PLUGGED

Run in drill pipe to 7860' and set 265 sx plug, pulled drill pipe to 6890'  
and set 280 sx plug and pulled drill pipe to 5960' and set 210 sx for kick off plug.

(USE REVERSE SIDE IF NEEDED)

Were tools, tubing, casing, etc., lost or left  
in the hole before or during plugging?

☐ YES

☒ NO

If yes, give details:

Did a Service Company pump mud,  
spot cement, or set bridge plugs?

☒ YES

☐ NO

If yes, give name and address:

Halliburton

Was the well plugged by a Company or  
Contractor other than Owner or Operator?

☐ YES

☒ NO

If yes, give name and address:

Representatives of Owner, Operator, Company, or Contractor who witnessed plugging

Willie Masterson

## CERTIFICATE

I, William E. Booker of Strickler Geological Services, Inc. (company  
state that I am authorized by said Owner or Operator to make this report; and that this report was prepared under my supervision and direct  
and that the facts stated herein are true, correct and complete to the best of my knowledge.

SIGNATURE

*William E. Booker*

ADDRESS

1425 S. Mission, Mt. Pleasant, MI

TITLE

Geologist

## FINAL INSPECTIONS

DEPARTMENT REPRESENTATIVE

DATE

DEPARTMENT REPRESENTATIVE

DATE

B-30

NAME OF OWNER OR OPERATOR  PPG Oil & Gas Co., Inc.		ADDRESS OF OWNER OR OPERATOR  2258 Enterprise Drive Mt. Pleasant, MI 48858	
NAME OF DRILLING CONTRACTOR  Bigard Drilling Company		ADDRESS OF DRILLING CONTRACTOR  1315 S. Mission Mt. Pleasant, MI 48858	
WELL NAME Lutz		WELL NUMBER 1-34A	PERMIT NUMBER 024-841-367
LOCATION NW NW NE		SECTION 34	TWP. 17N RANGE 9W
TOWNSHIP Hersey		COUNTY Osceola	
FOOTAGE 500 Ft. from North Line and 500 Ft. from West Line of quarter section N or S E or W			
DATE DRILLING COMMENCED 7-1-84	DATE DRILLING COMPLETED 7-10-84	DATE WELL COMPLETED 7-10-84	TYPE OF WELL Abandoned Test
FORMATION COMPLETED IN Niagaran	TOTAL DEPTH 8447	ELEVATION KB 1193.8	RB RT RF 1192.2 GN 1176.8
ROTARY TDOLS From 0 Feet to 8447 Feet		CABLE TOOLS From                      Feet to                      Feet	

WELL CASING RECORD

TUBING AND CASING DATA				CEMENTING DATA			PERFORATIONS OR OPEN HDLE		
SIZE	LB./FT.	GRADE	DEPTH	SACKS	TYPE	STAGING DEPTH(S)	NO. HOLES	FROM	TO
24"	130	K-55	65	DP					
13 3/8"	54.5	H-40	860	950	Comm/CI A				
9 5/8"	43.5	N-80	5430	1. 600/200 Comm/CI A					
				2. 750/100 Comm/CI A		3670 DV Tool			

WATER ZONES

WIRE LINE LOGS RUN

FORMATION	FROM	TO	AMOUNT	SERVICE COMPANY	TYPE LOG	INTERVAL LOGGED	COPY TO SURVEY
(Fresh)							
None				None			

FRACTURE OR ACID TREATMENT

SOLUTION MINING

DATE	FROM	TO	QUANTITY	NAME AND NUMBER OF INJECTION AND TARGET WELL - DISTANCE APART
None				None

The information in and attached to this report is complete and correct.

SIGNATURE

TITLE

DATE

*William E. Brooks*

Geologist

8/13/84

B-31

GIVE COMPLETE FORMATION RECORD ON REVERSE SIDE

STATE OF MICHIGAN  
DEPARTMENT OF NATURAL RESOURCES  
GEOLOGICAL SURVEY DIVISION

MINERAL WELL PLUGGING RECORD

File in DUPLICATE Within 30 Days After Plugging is Completed

PERMIT NUMBER

024-841-367

DATE

8/13/84

OWNER OR OPERATOR

PPG Oil & Gas Co., Inc.

ADDRESS

2258 Enterprise Drive, Mt. Pleasant, MI 48858

WELL NAME

Lutz

WELL NUMBER

1-34A

WELL LOCATION

NW ¼ NW ¼ NE ¼ SEC. 34 T. 17N R. 9W

TOWNSHIP

Hersey

COUNTY

Oscoda

TYPE OF WELL (Brine, Disposal, Storage, or Test)

Abandoned Mineral Test

TOTAL DEPTH

8447

FORMATION

Niagaran

DATE PLUGGING STARTED

7-11-84

DATE PLUGGING COMPLETED

7-12-84

WAS PERMISSION OF DEPT. OF NATURAL RESOURCES  
OBTAINED BEFORE PLUGGING BEGAN?

☒ YES

☐ NO

NAME OF DEPARTMENT REPRESENTATIVE WHO AUTHORIZED OR SUPERVISED PLUGGING

Jack Snider

CASING SIZE	WHERE SET	AMOUNT RECOVERED	SHOT OR RIPPED	TYPE OF BRIDGES OR PLUGS	DEPTH PLACED	NUMBER SACKS
24"	65	None		Cement	8448	100
13 3/8"	860	None		Cement	8100	130
9 5/8"	5430	None		Cement	7400	185
				Cement - Kick Plug	6800	130

DESCRIBE IN DETAIL HOW WELL WAS PLUGGED

Ran in Drill pipe to 8448' and spotted 100 sx, pulled drill pipe to 8100' and spotted 130 sx, pulled drill pipe to 7400' and spotted 185 sx, pulled drill pipe to 6800' and spotted 130 sx.

(USE REVERSE SIDE IF NEEDED)

Were tools, tubing, casing, etc., lost or left  
in the hole before or during plugging?

☐ YES

☒ NO

If yes, give details:

Did a Service Company pump mud,  
spot cement, or set bridge plugs?

☒ YES

☐ NO

If yes, give name and address:  
Halliburton

Was the well plugged by a Company or  
Contractor other than Owner or Operator?

☐ YES

☒ NO

If yes, give name and address:

Representatives of Owner, Operator, Company, or Contractor who witnessed plugging

Willie Masterson

CERTIFICATE

I, William E. Booker of Strickler Geological Services, Inc. (company) state that I am authorized by said Owner or Operator to make this report; and that this report was prepared under my supervision and direct and that the facts stated herein are true, correct and complete to the best of my knowledge.

SIGNATURE

*William E. Booker*

ADDRESS

1425 S. Mission, Mt. Pleasant, MI

TITLE

Geologist

FINAL INSPECTIONS

DEPARTMENT REPRESENTATIVE

DATE

DEPARTMENT REPRESENTATIVE

DATE

NAME OF OWNER OR OPERATOR PPG OIL & GAS COMPANY, INC.		ADDRESS OF OWNER OR OPERATOR 2258 Enterprise Drive Mt. Pleasant, MI 48858			
NAME OF DRILLING CONTRACTOR INDRIL, INC.		ADDRESS OF DRILLING CONTRACTOR PO Box 668 Mt. Pleasant, MI 48858			
WELL NAME LUTZ		WELL NUMBER 1-34B	PERMIT NUMBER 025-841-367		
LOCATION NW $\frac{1}{4}$ NW $\frac{1}{4}$ NE $\frac{1}{4}$		SECTION 34	TWP. 17N	RANGE 9W	
TOWNSHIP Hersey		COUNTY Osceola			
FOOTAGE 500 Ft. from North Line and 500 Ft. from West Line of quarter section N or S E or W					
DATE DRILLING COMMENCED 8/2/84	DATE DRILLING COMPLETED 8/15/84	DATE WELL COMPLETED		TYPE OF WELL Abandoned mineral test	
FORMATION COMPLETED IN Niagaran	TOTAL DEPTH 8837'	ELEVATION KB 1193.8	RB	RT 1192.2	RF 1176.8
ROTARY TOOLS From 0 Feet to 8837 Feet		CABLE TOOLS From Feet to Feet			

## WELL CASING RECORD

TUBING AND CASING DATA				CEMENTING DATA			PERFORATIONS OR OPEN HOLE		
SIZE	LB./FT.	GRADE	DEPTH	SACKS	TYPE	STAGING DEPTH(S)	NO. HOLES	FROM	TO
24"	130	K-55	66	D.P.					
13-3/8	54.5	H-40	860	950	Common C1 A				
9-5/8	43.5	N-80	5430	(1)	600/200 common C1 A				
				(2)	750/100 common C1 A	3670	IV Tool		

## WATER ZONES

FORMATION	FROM	TO	AMOUNT	SERVICE COMPANY	TYPE LOG	INTERVAL LOGGED	COPY TO SURVEY
(Fresh)				NONE			
NONE							

## WIRE LINE LOGS RUN

FORMATION	FROM	TO	AMOUNT	SERVICE COMPANY	TYPE LOG	INTERVAL LOGGED	COPY TO SURVEY
(Fresh)				NONE			
NONE							

### FRACTURE OR ACID TREATMENT

DATE	FROM	TO	QUANTITY	NAME AND NUMBER OF INJECTION AND TARGET WELL - DISTANCE APART
NONE				NONE

## SOLUTION MINING

DATE	FROM	TO	QUANTITY	NAME AND NUMBER OF INJECTION AND TARGET WELL - DISTANCE APART
NONE				NONE

The information in and attached to this report is complete and correct.

SIGNATURE <i>William E. Booker</i>	TITLE Geologist	DATE 10/4/84
---------------------------------------	--------------------	-----------------

B-33

GIVE COMPLETE FORMATION RECORD ON REVERSE SIDE

STATE OF MICHIGAN  
DEPARTMENT OF NATURAL RESOURCES  
GEOLOGICAL SURVEY DIVISION

MINERAL WELL PLUGGING RECORD

File in DUPLICATE Within 30 Days After Plugging is Completed

PERMIT NUMBER  
027-841-367

DATE  
7-31-84

ABANDONED HOLE

OWNER OR OPERATOR  
PPG Oil & Gas Co., Inc.

ADDRESS  
2258 Enterprise Drive, Mt. Pleasant, MI 48858

WELL NAME  
Lutz (Abandoned Hole)

WELL NUMBER  
1-34C

WELL LOCATION  
NW ¼ NW ¼ NE ¼ SEC. 34 T. 17N R. 9W

TOWNSHIP  
Hersey

COUNTY  
Osceola

TYPE OF WELL (Brine, Disposal, Storage, or Test)  
Dry Hole

TOTAL DEPTH  
7,319'

FORMATION  
A-2 Salt

DATE PLUGGING STARTED  
7-29-84

DATE PLUGGING COMPLETED  
7-29-84

WAS PERMISSION OF DEPT. OF NATURAL RESOURCES  
OBTAINED BEFORE PLUGGING BEGAN?  
by Mike Moss

☒ YES ☐ NO

NAME OF DEPARTMENT REPRESENTATIVE WHO AUTHORIZED OR SUPERVISED PLUGGING

CASING SIZE	WHERE SET	AMOUNT RECOVERED	SHOT OR RIPPED	TYPE OF BRIDGES OR PLUGS	DEPTH PLACED	NUMBER SACKS
				Cement	5,900	150
				Cement	5,500	200

DESCRIBE IN DETAIL HOW WELL WAS PLUGGED

Lost hole, tools could not be recovered. Plugged back from 6,799'-5,900' with 150 sacks  
HOWCO Lite and from 5,900'-5,500' with 200 sacks Kick cement.

(USE REVERSE SIDE IF NEEDED)

Were tools, tubing, casing, etc., lost or left  
in the hole before or during plugging?

☒ YES ☐ NO

If yes, give details:

Did a Service Company pump mud,  
spot cement, or set bridge plugs?

☒ YES ☐ NO

If yes, give name and address:

Halliburton Services  
Box 519, Kalkaska, MI 49646

Was the well plugged by a Company or  
Contractor other than Owner or Operator?

☐ YES ☒ NO

If yes, give name and address:

Representatives of Owner, Operator, Company, or Contractor who witnessed plugging

W. Masterson

CERTIFICATE

I, Donald P. Smith of PPG Oil & Gas Co., Inc. (company),  
state that I am authorized by said Owner or Operator to make this report; and that this report was prepared under my supervision and direction  
and that the facts stated herein are true, correct and complete to the best of my knowledge.

SIGNATURE

ADDRESS

2258 Enterprise Drive  
Mt. Pleasant, MI 48858

TITLE

Exploration Engineer

FINAL INSPECTIONS

DEPARTMENT REPRESENTATIVE

DATE

DEPARTMENT REPRESENTATIVE

DATE

STATE OF MICHIGAN  
DEPARTMENT OF NATURAL RESOURCES  
GEOLOGICAL SURVEY DIVISION

MINERAL WELL PLUGGING RECORD

File in DUPLICATE Within 30 Days After Plugging is Completed

PERMIT NUMBER

025-841-367

DATE

10/4/84

OWNER OR OPERATOR

PPC OIL & GAS COMPANY, INC.

ADDRESS

2258 Enterprise Drive, Mt. Pleasant, MI 48858

WELL NAME

LUTZ

WELL NUMBER

1-34B

WELL LOCATION

NW ¼ NW ¼ NE ¼ SEC. 34 T. 17N R. 9W

TOWNSHIP

Hersey

COUNTY

Osceola

TYPE OF WELL (Brine, Disposal, Storage, or Test)

Abandoned test well

TOTAL DEPTH

8837'

FORMATION

Niagaran

DATE PLUGGING STARTED

8/16/84

DATE PLUGGING COMPLETED

8/17/84

WAS PERMISSION OF DEPT. OF NATURAL RESOURCES  
OBTAINED BEFORE PLUGGING BEGAN?

☒ YES ☐ NO

NAME OF DEPARTMENT REPRESENTATIVE WHO AUTHORIZED OR SUPERVISED PLUGGING

Mike Moss

CASING SIZE	WHERE SET	AMOUNT RECOVERED	SHOT OR RIPPED	TYPE OF BRIDGES OR PLUGS	DEPTH PLACED	NUMB SACK
24"	66	None		Cement	8837	50
13-3/8"	860	None		"	8700	225
9-5/8"	5430	None		"	7400	100
				"	7050	270
				"	5500	50
				"	5350	1135
				"	150	65

EXPAND IN DETAIL HOW WELL WAS PLUGGED

Ran D.P. open ended to 8837' and spotted 50 sx; pulled D.P. to 8700' and spotted 225 sx; pulled D.P. to 7400' and spotted 100 sx; pulled D.P. to 7050' and spotted 270 sx; pulled D.P. to 5500' and spotted 50 sx; pulled D.P. to 5350' and spotted 1135 sx; pulled D.P. to 150' and spotted 65 sx.

USE REVERSE SIDE IF NEEDED

Were tools, tubing, casing, etc., lost or left  
in the hole before or during plugging?

☐ YES ☒ NO

If yes, give details:

Did a Service Company pump mud,  
spot cement, or set bridge plugs?

☒ YES ☐ NO

If yes, give name and address:

Halliburton

Was the well plugged by a Company or  
Contractor other than Owner or Operator?

☐ YES ☒ NO

If yes, give name and address:

Representatives of Owner, Operator, Company, or Contractor who witnessed plugging

Marvin Woods

CERTIFICATE

William E. Booker

of Strickler Geological Services, Inc.

(company)

I state that I am authorized by said Owner or Operator to make this report; and that this report was prepared under my supervision and direction and that the facts stated herein are true, correct and complete to the best of my knowledge.

SIGNATURE

*William E. Booker*

ADDRESS

1425 South Mission Road  
Mt. Pleasant, MI 48858

TITLE

Geologist

FINAL INSPECTIONS

DEPARTMENT REPRESENTATIVE

DATE

DEPARTMENT REPRESENTATIVE

DATE

STATE OF MICHIGAN  
DEPARTMENT OF NATURAL RESOURCES  
LOG OF OIL, GAS, DISPOSAL OR STORAGE WELL (ACT 61)  
Submit in DUPLI. Within 30 Days after Well Completion

PERMIT NUMBER  
36186  
DEEPENING PERMIT NUMBER

NAME(S) & ADDRESS OF OWNER(S) SHOWN ON PERMIT Willmet, Inc. 2250 Enterprise Drive Mt. Pleasant, MI 48858				NAME & ADDRESS OF DRILLING CONTRACTOR(S) T. D. Provins Drilling Company 2113 Enterprise Drive Mt. Pleasant, MI 48858				
LEASE NAME(S) & WELL NUMBER SHOWN ON PERMIT Paine #1-35						DIRECTIONALLY DRILLED YES <input type="checkbox"/> NO <input checked="" type="checkbox"/>		
SURFACE LOCATION NE NW NE		SECTION 35		TOWNSHIP 17N		RANGE 9W		
TOWNSHIP NAME Hersey		COUNTY NAME Osceola		FOOTAGES (North/South) 460 Ft. from North Line and 852 Ft. from West Line of quarter section		FOOTAGES (East/West) Line of quarter section		
SUBSURFACE LOCATION		SECTION		TOWNSHIP		RANGE		
TOWNSHIP NAME		COUNTY NAME		FOOTAGES (North/South) Ft. from Line and Ft. from Line of quarter section		FOOTAGES (East/West) Line of quarter section		
DATE	DRILLING BEGUN 11-6-82		TOTAL DEPTH OF WELL Driller 8309 Log 8307		TYPE WELL Gas Well		ELEVATIONS	
	DRILLING COMPLETED 12-21-82		FORMATION AT T.D. Cincinnatian		FT. DRLD. - ROTARY TOOLS From 0 To 8307		K.B. 1215	R.F. 1213
	WELL COMPLETED 2-8-83		PRODUCING FORMATION(S) Burnt Bluff		FT. DRLD. - CABLE TOOLS From To		R.T.	Grd. 1191

CASING, CASING LINERS AND CEMENTING

PERFORATIONS

SIZE	WHERE SET	CEMENT	Ft. Pulled	DATE	NUMBER HOLES	INTERVAL PERFORATED	OPEN	
							YES	NO
24"	56'	D.P.	---					
13 3/8"	852'	775 Sx	---	1-15-83	2x/ft	8115 - 8117	XX	
9 5/8"	5530'	2400 Sx	---	1-15-83	2x/ft	8077-80, 86-89,	XX	
5 1/2"	8308'	1100 Sx	---			99-8105		

GROSS PAY INTERVALS

ALL OTHER OIL AND GAS SHOWS OBSERVED OR LOGGED

FORMATION	OIL OR GAS	FROM	TO	FORMATION	OIL OR GAS	DEPTH	WHERE OBSERVED (X)					
							Samp-les	Odor	Pits	Mud Line	Gas Log	Fill Up
Burnt Bluff	Gas	8076	8118	Reed City Zn	Gas	4150					X	
				Sour Zone	Gas	4710					X	
				Manitoulin	Gas	8240					X	

STIMULATION BY ACID OR FRACTURING

WATER FILL UP (F.U.) OR LOST CIRCULATION (L.C.) (X)

DATE	Interval Treated	Materials and amount used	FORMATION	F.U.	L.C.	DEPTH	AMOUNT
	500 gal. 28%		None				

MECHANICAL LOGS, LIST EACH TYPE RUN

DEPTH CORRECTION DEVIATION SURVEY PLUGGED BACK

Brand	(X)	LOG TYPES	LOGGED INTERVALS	DEPTH	CORRECT'N	RUN AT	DEGREES	YES	NO	DEPTH
Schlumberger	XX	Sonic	200 - 8307			3200	1 1/2°			
Birdwell		LDT-CNL	200 - 8307			3800	1 1/2°			
		DLL-MLL	3300- 8307			5850	1 1/2°			
McCull.	XX	Bond Log				7032	2 1/4°			

PRODUCTION TEST DATA

OIL - Bbls/day	GRAVITY - °API	COND. Bbls/day	GAS - MCF/day	WATER - Bbls/day	H <sub>2</sub> S - Grains/100 cu. ft.	B.H.P. AND DEPTH
-----	-----	-----	3000	2 Bbls	-----	4702-8097

I AM RESPONSIBLE FOR THIS REPORT. THE INFORMATION IS COMPLETE AND CORRECT.

DATE 2-21-83	NAME AND TITLE (PRINT) William E. Booker, Geologist B-40	SIGNATURE <i>William E. Booker</i>
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NOTICE REPORT COMPLETE SAMPLE AND FORMATION RECORD AND DRILL STEM TEST INFORMATION ON REVERSE SIDE

R - 7210  
Rev. 3/77



DEPARTMENT OF NATURAL RESOURCES  
LOG OF OIL, GAS, DISPOSAL OR STORAGE WELL (ACT 61)  
Submit in DUPLICATE Within 30 Days after Well Completion

36355

DEEPENING PERMIT NUMBER

NAME(S) & ADDRESS OF OWNER(S) SHOWN ON PERMIT Willmet, Inc. 2250 Enterprise Drive Mt. Pleasant, MI 48858				NAME & ADDRESS OF DRILLING CONTRACTOR(S) T. D. Provins Drilling Company 2113 Enterprise Drive Mt. Pleasant, MI 48858			
LEASE NAME(S) & WELL NUMBER SHOWN ON PERMIT State-Hersey #2-35						DIRECTIONALLY DRILLED YES <input type="checkbox"/> NO <input checked="" type="checkbox"/>	
SURFACE LOCATION NE NW SW		SECTION 35	TOWNSHIP 17N	RANGE 9W	TOWNSHIP NAME Hersey		
FOOTAGES (North/South) 460 Ft. from North		Line and 854		FOOTAGES (East/West) Ft. from West		Line of quarter section COUNTY NAME Osceola	
SUBSURFACE LOCATION		SECTION	TOWNSHIP	RANGE	TOWNSHIP NAME		
FOOTAGES (North/South)		Line and		FOOTAGES (East/West)		Line of quarter section COUNTY NAME	
DATE	DRILLING BEGUN 1-2-83		TOTAL DEPTH OF WELL Driller 8310 Log 8313		TYPE WELL Temp. Aband.		ELEVATIONS
	DRILLING COMPLETED 1-28-83		FORMATION AT T.D. Cincinnatian		FT. DRLD. - ROTARY TOOLS From 0 To 8310		
	WELL COMPLETED		PRODUCING FORMATION(S) None		FT. DRLD. / CABLE TOOLS From To		
					K.B. 1236	R.F. 1235	
					R.T.	Grd. 1213	

CASING, CASING LINERS AND CEMENTING

PERFORATIONS

SIZE	WHERE SET	CEMENT	Ft. Pulled	DATE	NUMBER HOLES	INTERVAL PERFORATED	OPEN	
24"	72'	D.P.					YES	NO
11 3/4"	954	550 Sx		NONE				
8 5/8"	5540	1110 Sx						

GROSS PAY INTERVALS

NO GAS SHOWS OBSERVED OR LOGGED

FORMATION	OIL OR GAS	FROM	TO	DEPTH	WHERE OBSERVED (X)					
NONE					Sam- ples	Odor	Pits	Mud Line	Gas Log.	Fill Up
				1700					X	
				4100					X	
				Gas 4700					X	

STIMULATION BY ACID OR FRACTURING

WATER FILL UP (F.U.) OR LOST CIRCULATION (L.C.) (X)

DATE	Interval Treated	Materials and amount used	FORMATION	F.U.	L.C.	DEPTH	AMOUNT
NONE			NONE				

MECHANICAL LOGS, LIST EACH TYPE RUN

DEPTH CORRECTION DEVIATION SURVEY PLUGGED BACK

Brand	(X)	LOG TYPES	LOGGED INTERVALS	DEPTH	CORRECTN	RUN AT	DEGREES	YES	NO	DEPTH
Schlumberger	XX	LDT-CNL-GR	200 - 8313			2500	0°			
Birdwell		Sonic	200 - 8313			5100	1°			
		DLL-MLL	3300 - 8313			6500°	0°			
						6900	3/4°			

PRODUCTION TEST DATA

OIL -- Bbls/day	GRAVITY -- °API	COND. Bbls/day	GAS -- MCF/day	WATER -- Bbls/day	H <sub>2</sub> S -- Grains/100 cu. ft.	B.H.P. AND DEPTH
-----------------	-----------------	----------------	----------------	-------------------	--	------------------

I AM RESPONSIBLE FOR THIS REPORT. THE INFORMATION IS COMPLETE AND CORRECT.

DATE	NAME AND TITLE (PRINT)	SIGNATURE
2-21-83	William E. Booker, Geologist B-41	William Booker

NOTICE REPORT COMPLETE SAMPLE AND FORMATION RECORD AND DRILL STEM TEST INFORMATION ON REVERSE SIDE

R - 7210

Rev 3/77

DEPARTMENT OF NATURAL RESOURCES  
GEOLOGICAL SURVEY DIVISION

WELL PLUGGING RECORD

(Submit in TRIPLICATE Within 30 Days After Plugging is Completed)

PERMIT NUMBER

36355

FIELD NAME

COMPLETE NAME(S) AND ADDRESS OF WELL OWNER

Willmet, Inc., 2250 Enterprise Drive, Mt. Pleasant, MI 48858

COMPLETE LEASE OR FARM NAME(S)

State-Hersey

WELL NUMBER

2-35

WELL LOCATION

NE ¼ NW ¼ SW ¼ SEC. 35 T. 17N R. 9W

TOWNSHIP

Hersey

COUNTY

Osceola

TYPE OF WELL (Oil, Gas, Dry Hole, etc.)

Dry Hole

TOTAL DEPTH

8313

FORMATION

Cincinnatian

DATE PLUGGING STARTED

1-29-83

DATE PLUGGING COMPLETED

1-30-83

DEPT. REPRESENTATIVE(S) WHO ISSUED PERMIT OR WITNESSED PLUGGING

Snider

CASING RECORD

SIZE CASING	DEPTH SET	AMOUNT RECOVERED	SHOT OR RIPPED
24"	72'	---	
11 3/4"	954'	---	
8 5/8"	5540'	---	

BRIDGES OR PLUGS

TYPE (Brush, Stone, Cement, Mechanical, etc.)	DEPTH PLACED	SACKS OF CEM AND ADDITIV
Cement	7909-8310	120 Sx
Cement	6850-7909	120 Sx
Cement	6650-6850	60 Sx
Cement	5500-6650	145 Sx

Were tools, tubing, casing, etc., lost or left in the hole before or during plugging?

☐ YES ☒ NO

If yes, give details:

Did a Service Company pump mud, spot cement, or set bridge plugs?

☒ YES ☐ NO

If yes, give name and address:

Dowell

Was the well plugged by a Company or Contractor other than Owner or Operator?

☐ YES ☒ NO

If yes, give name and address:

Representatives of Owner, Operator, Company, or Contractor who witnessed plugging:

Marvin Woods

DESCRIBE IN DETAIL HOW WELL WAS PLUGGED

Ran drill pipe to 8310, spotted 120 sx, pulled drill pipe to 7909 and spotted 120 sx, pulled drill pipe to 6850 and spotted 60 sx, pulled drill pipe to 6650 and spotted 145 sx.

USE REVERSE SIDE IF NEEDED

CERTIFICATION

"I state that I am authorized by said Owner or Operator to make this report; and that this report was prepared under my supervision and control, and that the facts stated herein are true, correct and complete to the best of my knowledge."

NAME AND TITLE (Typed or Printed)

William E. Booker, Geologist

COMPANY NAME AND ADDRESS

Strickler Geological Services, Inc.  
1425 S. Mission  
Mt. Pleasant, MI 48858

SIGNATURE

*William E. Booker*

DATE (Month, Day, Year)

2-21-83 B-42

2. Plugging and Abandonment Records for the State-Hersey 2-35 well:

The State-Hersey 2-35 well was temporarily abandoned and plugged back to 5500 feet on January 29, 1983. The P&A report for this work was previously submitted. This initial plug completely isolated the well from the Class III injection horizon at approximately 7500 feet.

Our records indicate the well was plugged back to surface and capped on August 28, 1984. To this point we have been unable to locate the official DNR P&A report. We have, however, included the cementing company's (Halliburton Services) job log and invoice for the plugging work.



FILE COPY

DEPARTMENT OF NATURAL RESOURCES

CADILLAC DISTRICT OFFICE  
9015 Mackinaw Road  
Cadillac, Michigan 49601

January 10, 1962

[illegible]

1. The following information is being furnished to you for your information only. It is not intended to be used for any other purpose.

1. The first step is to identify the problem. This involves understanding the situation and the goals that need to be achieved. It is important to gather all relevant information and to define the problem clearly.

[illegible]

1998, 1999, 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016, 2017, 2018, 2019, 2020, 2021, 2022, 2023, 2024, 2025, 2026, 2027, 2028, 2029, 2030, 2031, 2032, 2033, 2034, 2035, 2036, 2037, 2038, 2039, 2040, 2041, 2042, 2043, 2044, 2045, 2046, 2047, 2048, 2049, 2050, 2051, 2052, 2053, 2054, 2055, 2056, 2057, 2058, 2059, 2060, 2061, 2062, 2063, 2064, 2065, 2066, 2067, 2068, 2069, 2070, 2071, 2072, 2073, 2074, 2075, 2076, 2077, 2078, 2079, 2080, 2081, 2082, 2083, 2084, 2085, 2086, 2087, 2088, 2089, 2090, 2091, 2092, 2093, 2094, 2095, 2096, 2097, 2098, 2099, 2100, 2101, 2102, 2103, 2104, 2105, 2106, 2107, 2108, 2109, 2110, 2111, 2112, 2113, 2114, 2115, 2116, 2117, 2118, 2119, 2120, 2121, 2122, 2123, 2124, 2125, 2126, 2127, 2128, 2129, 2130, 2131, 2132, 2133, 2134, 2135, 2136, 2137, 2138, 2139, 2140, 2141, 2142, 2143, 2144, 2145, 2146, 2147, 2148, 2149, 2150, 2151, 2152, 2153, 2154, 2155, 2156, 2157, 2158, 2159, 2160, 2161, 2162, 2163, 2164, 2165, 2166, 2167, 2168, 2169, 2170, 2171, 2172, 2173, 2174, 2175, 2176, 2177, 2178, 2179, 2180, 2181, 2182, 2183, 2184, 2185, 2186, 2187, 2188, 2189, 2190, 2191, 2192, 2193, 2194, 2195, 2196, 2197, 2198, 2199, 2200, 2201, 2202, 2203, 2204, 2205, 2206, 2207, 2208, 2209, 2210, 2211, 2212, 2213, 2214, 2215, 2216, 2217, 2218, 2219, 2220, 2221, 2222, 2223, 2224, 2225, 2226, 2227, 2228, 2229, 2230, 2231, 2232, 2233, 2234, 2235, 2236, 2237, 2238, 2239, 2240, 2241, 2242, 2243, 2244, 2245, 2246, 2247, 2248, 2249, 2250, 2251, 2252, 2253, 2254, 2255, 2256, 2257, 2258, 2259, 2260, 2261, 2262, 2263, 2264, 2265, 2266, 2267, 2268, 2269, 2270, 2271, 2272, 2273, 2274, 2275, 2276, 2277, 2278, 2279, 2280, 2281, 2282, 2283, 2284, 2285, 2286, 2287, 2288, 2289, 2290, 2291, 2292, 2293, 2294, 2295, 2296, 2297, 2298, 2299, 2300, 2301, 2302, 2303, 2304, 2305, 2306, 2307, 2308, 2309, 2310, 2311, 2312, 2313, 2314, 2315, 2316, 2317, 2318, 2319, 2320, 2321, 2322, 2323, 2324, 2325, 2326, 2327, 2328, 2329, 2330, 2331, 2332, 2333, 2334, 2335, 2336, 2337, 2338, 2339, 2340, 2341, 2342, 2343, 2344, 2345, 2346, 2347, 2348, 2349, 2350, 2351, 2352, 2353, 2354, 2355, 2356, 2357, 2358, 2359, 2360, 2361, 2362, 2363, 2364, 2365, 2366, 2367, 2368, 2369, 2370, 2371, 2372, 2373, 2374, 2375, 2376, 2377, 2378, 2379, 2380, 2381, 2382, 2383, 2384, 2385, 2386, 2387, 2388, 2389, 2390, 2391, 2392, 2393, 2394, 2395, 2396, 2397, 2398, 2399, 2400, 2401, 2402, 2403, 2404, 2405, 2406, 2407, 2408, 2409, 2410, 2411, 2412, 2413, 2414, 2415, 2416, 2417, 2418, 2419, 2420, 2421, 2422, 2423, 2424, 2425, 2426, 2427, 2428, 2429, 2430, 2431, 2432, 2433, 2434, 2435, 2436, 2437, 2438, 2439, 2440, 2441, 2442, 2443, 2444, 2445, 2446, 2447, 2448, 2449, 2450, 2451, 2452, 2453, 2454, 2455, 2456, 2457, 2458, 2459, 2460, 2461, 2462, 2463, 2464, 2465, 2466, 2467, 2468, 2469, 2470, 2471, 2472, 2473, 2474, 2475, 2476, 2477, 2478, 2479, 2480, 2481, 2482, 2483, 2484, 2485, 2486, 2487, 2488, 2489, 2490, 2491, 2492, 2493, 2494, 2495, 2496, 2497, 2498, 2499, 2500, 2501, 2502, 2503, 2504, 2505, 2506, 2507, 2508, 2509, 2510, 2511, 2512, 2513, 2514, 2515, 2516, 2517, 2518, 2519, 2520, 2521, 2522, 2523, 2524, 2525, 2526, 2527, 2528, 2529, 2530, 2531, 2532, 2533, 2534, 2535, 2536, 2537, 2538, 2539, 2540, 2541, 2542, 2543, 2544, 2545, 2546, 2547, 2548, 2549, 2550, 2551, 2552, 2553, 2554, 2555, 2556, 2557, 2558, 2559, 2560, 2561, 2562, 2563, 2564, 2565, 2566, 2567, 2568, 2569, 2570, 2571, 2572, 2573, 2574, 2575, 2576, 2577, 2578, 2579, 2580, 2581, 2582, 2583, 2584, 2585, 2586, 2587, 2588, 2589, 2590, 2591, 2592, 2593, 2594, 2595, 2596, 2597, 2598, 2599, 2600, 2601, 2602, 2603, 2604, 2605, 2606, 2607, 2608, 2609, 2610, 2611, 2612, 2613, 2614, 2615, 2616, 2617, 2618, 2619, 2620, 2621, 2622, 2623, 2624, 2625, 2626, 2627, 2628, 2629, 2630, 2631, 2632, 2633, 2634, 2635, 2636, 2637, 2638, 2639, 2640, 2641, 2642, 2643, 2644, 2645, 2646, 2647, 2648, 2649, 2650, 2651, 2652, 2653, 2654, 2655, 2656, 2657, 2658, 2659, 2660, 2661, 2662, 2663, 2664, 2665, 2666, 2667, 2668, 2669, 2670, 2671, 2672, 2673, 2674, 2675, 2676, 2677, 2678, 2679, 26

REPORT OF THE DIVISION

Brian D. Brady  
Environmental Quality Analyst  
616-775-9727

DOB/1204

cc: Dan Decker/file

Ian Halverson, GSD

**"PROTECTING MICHIGAN'S FUTURE"**

## DEPARTMENT OF NATURAL RESOURCES

ENVIRONMENTAL RESPONSE DIVISION

## ACTIVITY REPORT

## ACTIVITY

- ☐ RI/FS  
☒ Complaint Investigation  
☐ Clean-up Activities  
☐ Contractor Oversight  
☐ Photos Taken  
☐ Samples Taken

## PROGRAM

- ☐ CERCLA  
☒ Act 307  
☒ Act 245  
☐ LUST  
☐ Other

Facility Name Kalsium Chemicals	County Osceola	Date 12-28-90	Time on Activity 3 hrs
Address 11461 South 136th Avenue	City/Township Hersey	Facility/Site Number	Staff Brady
Person(s) Contacted Donald Metzger, Resident Manager			

REMARKS: Staff visited site in response to PEAS complaint that was received on 12/10/90.

Complaint alleged that Kalsium had several illegal discharges and or spills in the recent

past. 1) Spill of 20-40 gallons of a corrosion inhibitor (KW-100) which is added to process water at plant. 2) 4,000 - 5,000 gallons of concentrated brine water which ran into a ditch and then into an unlined pond. 3) Diesel fuel spillage (fuel is pumped down into a vent upmining of roof)

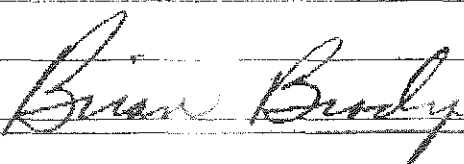
Staff said that there had been a loss of "a few" gallons of KW-100. Report showed that spills had been removed and stored in a tank on premises pending disposal to landfill. I acquired MSDS for the KW-100 and inspected spill area. It has since been covered with asphalt.

Some spillage could not be verified. Unlined pond was frozen, there was no visual evidence of any impact to plant life at the water/ice line. Unlined pond catches runoff water from parking lots and plant roof.

Diesel fuel is used at well location on 140th avenue. Because of snow cover a meeting will be arranged after snow melt to investigate this complaint.

Will write letter and require soil sample from spill area of KW-100 to be analyzed for 1,4-Dioxane. Also that minor spills be reported in future.

Signature



Date

1-9-91

Distribution:

Original - District File  
 Copy - Regional Supervisor  
 File - Other

ADD ADDITIONAL SHEETS AS NECESSARY

Page 1 of 1

Michigan Department of Natural Resources  
ENVIRONMENTAL RESPONSE DIVISION

RECEIVED

APR 15 1992

Fax Transmittal

LIC SECTION  
EPA -- REGION V

PLEASE DELIVER TO:

NAME: PATRICK SAIEHCOMPANY/DIVISION: EPA REGION VTELEPHONE NUMBER: 312-886-4240FAX NUMBER: 312-886-0957

SENT BY:

NAME: BRIAN BRADYJOB/TITLE: ERD CADILLACPHONE NUMBER: 616-775-9727FAX NUMBER: 616-775-9671TODAY'S DATE: 4-14-92

NOTE:

Your contact person for Kalam Chemical is Al Ruvick of  
MDNR Biological Survey Division in Lansing (517) 334-6957.  
I'm sending info pertaining to my last site visit. Suggest  
if you have additional questions - call Al at # above  
or Mike Moss at (616) 775-9727



MAY 23 1991

Kalium Chemicals P.O. Box 333, 11461 South 135th Avenue  
Hersey, Michigan 49639 Telephone: (616) 832-3755 Fax: (616) 832-3349

May 20, 1991

Mr. Erian Brady  
Environmental Quality Analyst  
Dept. of Natural Resources  
Cadillac District Office  
8015 Mackinaw Trail  
Cadillac, MI 49601

Dear Mr. Brady:

Enclosed is a copy of the laboratory report relating to the minor spill of corrosion inhibitor (KW-100, Petrolite) at the Kalium Chemicals plant site in Hersey, Michigan. As I noted in our phone conversation on May 17, 1991 the laboratory doing the analysis exceeded the allowable limit by three hours. I agree that this analysis is more representative of the clean up, even though it exceeded the allowable holding time, than a sample taken at this point in time would be due to the spring runoff, etc.

The contaminated soil is being stored in a steel tank which is sitting on an asphalt pad near the Solution Feed Plant. This material as well as other material will be properly disposed of during the coming fiscal year.

If you have any further questions, please feel free to contact me at the plant.

Sincerely,

Michael J. Mitchell  
Plant Chemist  
Kalium Chemicals, Ltd.  
616-832-3755

mit14



# GROUNDWATER INC.

MARCH 14, 1991  
No. 16, Vol. VIII

\*\*PRINTED ON 100% RECYCLED PAPER\*\*

P.O. BOX 242, HERSEY, MI 49639

(616) 832-4759

DON'T PUT OFF RECYCLING -- START  
DIFFERENCE.

TODAY. IF WE ALL DO A LITTLE, WE CAN MAKE A BIG

"Nobody made a greater mistake than one who did nothing because one could only do a  
little."  
-- Edmund Burke

## "LOCAL MONITORING" REVISITED

Back in September of 1985, after months of tedious negotiation with the Michigan Environmental Review Board (MERB), the DNR and PPG (now Kalium Chemicals), GROUNDWATER succeeded in getting the MERB to adopt a series of recommendations covering PPG's Michigan Potash Project. Those recommendations were circulated to GROUNDWATER's membership at that time. Since the MERB's recommendations were merely "advisory", however, formalizing them into a legally binding "consent agreement" to be signed by PPG, was left to the then newly formed DNR Office of Litigation and Program Services.

It appears that in reducing the MERB's recommendations to a consent agreement, the DNR, for reasons as yet unknown, undid much of GROUNDWATER's work. The MERB's "local monitoring" recommendations, watered down as they were, nonetheless could have required the industry to provide to local libraries, at PPG's expense, quarterly reports of their operations, clean-up and monitoring activities. Somehow, these provisions never found their way into any of the numerous draft agreements prepared by the DNR.

As if this gaffe weren't bad enough, the final draft consent agreement was never signed by PPG! Contained in that unsigned draft were the remaining safeguards GROUNDWATER fought so hard to assure: no toxics disposal, replacement of water wells, etc. Meanwhile, permits were issued, PPG began operations and in 1987, sold its interests to Kalium. As a result of these circumstances, PPG's promises to the MERB, GROUNDWATER and to local residents are unenforceable against PPG, Kalium or anyone else.

Whether through bungling or a willful breach of faith, the DNR has sabotaged this community's effort to gain a measure of local control over the future of its environment. And they wonder why we don't trust them!

505  
MAR 8 1991



*OSCEOLA*  
Kalium Chemicals P.O. Box 333, 11461 South 135th Avenue  
Harsey, Michigan 49639 Telephone: (616) 832-3755 Fax: (616) 832-3349

March 6, 1991

Mr. Brian D. Brady  
Environmental Quality Analyst  
Dept. of Natural Resources  
CAPOISAC DISTRICT OFFICE  
5015 Mackinaw Trail  
Capoigac, MI 49601

Dear Mr. Brady:

I am writing to inform you that we have been unable to obtain a proper sample due to frozen ground. The site of the spill has not been covered by additional fill and is therefore frozen.

A sample will be collected as soon as the ground thaws and will be analyzed for 1,4 Dioxane. The analytical results will be forwarded to you as soon as they are available.

If you have any questions, please contact me at the number below.

Sincerely,

Michael Mitchell  
Plant Chemist  
(616)-832-3755

mit2

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

EPA ID NUMBER


# UNDERGROUND INJECTION CONTROL PERMIT APPLICATION

(Collected under the authority of the Safe Drinking Water Act, Sections 1421, 1422, 40 CFR 144)

T/A C

UIC

READ ATTACHED INSTRUCTIONS BEFORE STARTING  
FOR OFFICIAL USE ONLY

Application approved mo day year			Date Received mo day year			Permit/Well Number			Comments		
						MI-133-3G-A002					
II. FACILITY NAME AND ADDRESS						III. OWNER/OPERATOR AND ADDRESS					
Facility Name Hersey Potash Facility						Owner/Operator Name Kalium Chemicals, Ltd.					
Street Address 11461 S. 135th Avenue						Street Address Suite 100, The East Tower; 2550 Golf Road					
City Hersey			State MI		ZIP Code 49639		City Rolling Meadows, IL			State IL	
										ZIP Code 60008-4051	
IV. OWNERSHIP STATUS (Mark 'x')						V. SIC CODES					
<input type="checkbox"/> A. Federal <input type="checkbox"/> B. State <input type="checkbox"/> C. Private <input checked="" type="checkbox"/> D. Public <input type="checkbox"/> E. Other (Explain)						1474					
VI. WELL STATUS (Mark 'x')											
<input type="checkbox"/> A. Operating		Date Started mo day year		<input checked="" type="checkbox"/> B. Modification/Conversion				<input checked="" type="checkbox"/> C. Proposed See Attached Note 1			
VII. TYPE OF PERMIT REQUESTED (Mark 'x' and specify if required)											
<input type="checkbox"/> A. Individual <input checked="" type="checkbox"/> B. Area		Number of Existing wells 6		Number of Proposed wells See Note 2		Name(s) of field(s) or project(s) Hersey Potash Project					
VIII. CLASS AND TYPE OF WELL (see reverse)											
A. Class(es) (enter code(s))		B. Type(s) (enter code(s))		C. If class is "other" or type is code 'x,' explain				D. Number of wells per type (if area permit)			
111		G						10 by end of 1992 20 within next 10 years			
IX. LOCATION OF WELL(S) OR APPROXIMATE CENTER OF FIELD OR PROJECT						X. INDIAN LANDS (Mark 'x')					
A. Latitude		B. Longitude		Township and Range							
Deg Min Sec		Deg Min Sec		Twp Range Sec		1/4 Sec		Feet from		Line	
1				7N 9W 26		NW					
XI. ATTACHMENTS						<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No					
(Complete the following questions on a separate sheet(s) and number accordingly; see instructions) FOR CLASSES I, II, III (and other classes) complete and submit on separate sheet(s) Attachments A — U (pp 2-6) as appropriate. Attach maps where required. List attachments by letter which are applicable and are included with your application:											
XII. CERTIFICATION											
I certify under the penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment. (Ref. 40 CFR 144.32)											
A. Name and Title (Type or Print)								B. Phone No. (Area Code and No.)			
Donald D. Metzger, Resident Manager								(616)-832-3755			
C. Signature								D. Date Signed			
								10-20-91			



**Cementing Procedure (around shoe) (cross out where necessary)**

Circulated 60 minutes, pumped in 49 (cu. ft.), (barrels)  
prewash, used bottom plug (yes, no), mixed cement ~~(1) above~~ 1, 2 and 3  
minutes, cement (2) above 77 minutes, top plug (yes, no) displaced with  
294 (cu. ft.), (barrels) in 50 minutes at rate of 6 BPM, CFM,  
(Bumped plug) (Did not bump plug). Final Pressure 2,000. Reciprocated  
pipe \_\_\_\_\_ feet while (mixing) and (displacing) cement. Displacing time \_\_\_\_\_  
minutes. Had \_\_\_\_\_ circulation (full, partial,  
none, etc.). Completed job at 22:51 a.m., p.m.

**Cementing Procedure (through DV at \_\_\_\_\_ feet) (cross out where necessary)**

Opened DV at \_\_\_\_\_ a.m., p.m., circulated \_\_\_\_\_ minutes, pumped in  
\_\_\_\_\_ (cu. ft.), (barrels) \_\_\_\_\_ prewash, mixed cement (3) above  
\_\_\_\_\_ minutes, cement (4) above \_\_\_\_\_ minutes, dropped closing plug, dis-  
placed with \_\_\_\_\_ (cu. ft.), (barrels) in \_\_\_\_\_ minutes at rate of \_\_\_\_\_  
BPM, CFM. (Bumped plug) (Did not bump plug). Final Pressure \_\_\_\_\_  
Displacing time \_\_\_\_\_ minutes. Had \_\_\_\_\_ circulation  
(full, partial, none, etc.)

**Remarks (Third Stage Job, etc.)**

Plug landed and float held, had mud flush return to surface, no cement.  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Marvin Wood

Foreman



STATE OF MICHIGAN  
REQUEST FOR TRANSFER OF PERMIT

TYPE OR PRINT

SUBMIT 4 COPIES TO: Department of Natural Resources  
Geological Survey Division  
Box 30028  
Lansing, Michigan 48909

Filing for change of ownership of well is required in accordance with ☐ Act 61, P.A. 1939 and ☒ Act 315 P.A. 1969, as amended, and Administrative Rules promulgated thereunder.

PERMIT NO <b>347-845-767</b>	WELL TYPE <b>Solution Mining</b>
FIELD NAME	
WELL NAME AND NUMBER <b>Kalium 1012 (formerly Thomas 3-26)</b>	
WELL LOCATION <b>S 1/4 NW 1/4 NW 1/4 SECTION 26 T 17N R 9W</b>	
TOWNSHIP <b>Hersey</b>	COUNTY <b>Osceola</b>

TRANSFER OF A PERMIT FROM:

NAME(S) OF SELLING OWNER(S)

**PPG Industries, Inc.**

ADDRESS: Number and Street -- City or Town -- State -- Zip Code -- Telephone

**One PPG Place Pittsburgh, PA 15272**

**(412) 434-2841**

All operating rights are discharged by:

Owner(s)

Representative(s)

Signature(s)

Date(s)

**PPG Industries, Inc. R.J. Samelson**

*R.J. Samelson* 9/6/88

ELIGIBILITY FOR PERMITS IS CONDITIONED UPON COMPLIANCE WITH THE STATUTES, RULES AND ORDERS OF THE DEPARTMENT OF NATURAL RESOURCES. PERMITS WILL NOT BE GRANTED TO PERSONS NOT IN COMPLIANCE.

NON-SUBMISSION AND/OR FALSIFICATION OF THIS INFORMATION MAY RESULT IN FINES AND/OR IMPRISONMENT.

TRANSFER OF A PERMIT TO:

NAME(S) OF ACQUIRING OWNER(S)

**Kalium Chemicals, Ltd.**

ADDRESS: Number and Street -- City or Town -- State -- Zip Code -- Telephone

**11126 South 140th Avenue Hersey, MI 49639**

**(616) 832-3206**

(We) (I) have acquired the well under this permit and assume full responsibility for the drilling, operation, and abandonment in conformity with the law, regulations and orders.

SURETY BOND:

☐ SINGLE WELL

☐ ATTACHED

BONDING CO. \_\_\_\_\_

☐ BLANKET

☐ ON FILE

BOND NUMBER \_\_\_\_\_

All operating rights and responsibilities are assumed by

Owner(s)

Representative(s)

Signature(s)

Date(s)

**Kalium Chemicals, Ltd. Donald D. Metzger**

*Donald D. Metzger* 9-19-88

FOR DEPARTMENT OF NATURAL RESOURCES USE ONLY

DISTRIBUTION BY DNR

☐ Lending

☒ Acquiring Owner

☐ Selling Owner

☐ Field

APPROVED

*Stephen J. Lough*  
Signature

10/17/88  
Date

MINERAL WELL COMPLETION REPORT  
TO BE FILED WITH THE SUPERVISOR WITHIN 60 DAYS  
AFTER COMPLETION OF WELL (ACT 315, P.A. 1969)

SUBMIT IN  
TRIPLICATE

NAME OF OWNER OR OPERATOR PPG INDUSTRIES, INC.		ADDRESS OF OWNER OR OPERATOR 2258 Enterprise Drive Mt. Pleasant, MI 48858		
NAME OF DRILLING CONTRACTOR INDRIL, INC.		ADDRESS OF DRILLING CONTRACTOR PO Box 668 Mt. Pleasant, MI 48858		
WELL NAME THOMAS		WELL NUMBER 3-26		PERMIT NUMBER 042-841-367
LOCATION SE 1/4 NW 1/4 NW 1/4		SECTION 26	TWP. 17N	RANGE 9W
TOWNSHIP Hersey		COUNTY Osceola		
FOOTAGE 929 Ft. from North Line and 650 Ft. from West Line of quarter section				
DATE DRILLING COMMENCED 11/19/84	DATE DRILLING COMPLETED 01/04/85	DATE WELL COMPLETED 01/07/85	TYPE OF WELL Test Well (D-5)	
FORMATION COMPLETED IN Niagaran	TOTAL DEPTH 7825 Dr; 7830 Log	ELEVATION KB 1162.1	RB	RT 1160.7 GN 1145.6
ROTARY TDDLS From 0 Feet to 7830 Feet		CABLE TDDLS From      Feet to      Feet		

WELL CASING RECORD

TUBING AND CASING DATA				CEMENTING DATA			PERFORATIONS OR OPEN HOLE		
SIZE	LB./FT.	GRADE	DEPTH	SACKS	TYPE	STAGING DEPTH(S)	NO. HOLES	FROM	TO
20"	94#		350'	Circ.	100 sacks				
13-3/8"	54.5#	H40	906'	750 sacks	light; 200 common				
9-5/8"	43.5#	N80	5455'	200 CIA, 600 light;	2nd stage	3634-surface	100 CIA, 800 light		
7"	23#	S95	7590'	950 POZ, 175 CIA					

WATER ZONES

WIRE LINE LOGS RUN

FORMATION	FROM	TO	AMOUNT	SERVICE COMPANY	TYPE LOG	INTERVAL LOGGED	COPY TO SURVEY
(Fresh)				Schlumberger	LDT-CNL-GR	100-7830	X
				"	MLL-DLL	3200-4170	X

FRACTURE OR ACID TREATMENT

SOLUTION MINING

DATE	FROM	TO	QUANTITY	NAME AND NUMBER OF INJECTION AND TARGET WELL - DISTANCE APART

The information in and attached to this report is complete and correct.

SIGNATURE <i>William E. Booker</i>	TITLE Geologist	DATE 01/21/85
---------------------------------------	--------------------	------------------

GIVE COMPLETE FORMATION RECORD ON REVERSE SIDE



NAME OF OWNER OR OPERATOR  PPG INDUSTRIES, INC.		ADDRESS OF OWNER OR OPERATOR  2258 Enterprise Drive Mt. Pleasant, MI 48858	
NAME OF DRILLING CONTRACTOR  INDRIL, INC.		ADDRESS OF DRILLING CONTRACTOR  PO Box 668 Mt. Pleasant, MI 48858	
WELL NAME THOMAS #1012		WELL NUMBER 3-26	PERMIT NUMBER 042-841-367
LOCATION SE 1/4 NW 1/4 NW 1/4		SECTION 26	TWP. 17N RANGE 9W
TOWNSHIP Hersey		COUNTY Osceola	
FOOTAGE 929 Ft. from North Line and 650 Ft. from West Line of quarter section			
DATE DRILLING COMMENCED 11/19/84	DATE DRILLING COMPLETED 01/04/85	DATE WELL COMPLETED 01/07/85	TYPE OF WELL Test Well (D-5)
FORMATION COMPLETED IN Niagaran	TOTAL DEPTH 7825 Dr; 7830 Log	ELEVATION KB 1162.1 RB RT RF 1160.7 GN 1145.6	
ROTARY TOOLS From 0 Feet to 7830 Feet		CABLE TOOLS From      Feet to      Feet	

WELL CASING RECORD

TUBING AND CASING DATA				CEMENTING DATA			PERFORATIONS OR OPEN HOLE		
SIZE	LB./FT.	GRADE	DEPTH	SACKS	TYPE	STAGING DEPTH(S)	NO. HOLES	FROM	TO
	94#		350'	Circ.	100 sacks				
13-3/8"	54.5#	H40	906'	750 sacks	light; 200 common				
9-5/8"	43.5#	N80	5455'	200 CIA	600 light; 2nd stage	3634-surface	100 CIA	800 light	
7"	23#	S95	7590'	950 POZ	175 CIH				

WATER ZONES

WIRE LINE LOGS RUN

FORMATION	FROM	TO	AMOUNT	SERVICE COMPANY	TYPE LOG	INTERVAL LOGGED	COPY TO SURVEY
(Fresh)				Schlumberger	LDT-CNL-GR	100-7830	X
				"	MLL-DLL	3200-4170	X

FRACTURE OR ACID TREATMENT

SOLUTION MINING

DATE	FROM	TO	QUANTITY	NAME AND NUMBER OF INJECTION AND TARGET WELL - DISTANCE APART

The information in and attached to this report is complete and correct.

SIGNATURE <i>William E. Braker</i>	TITLE Geologist	DATE 01/21/85
---------------------------------------	--------------------	------------------

GIVE COMPLETE FORMATION RECORD ON REVERSE SIDE

## CASING OR LINER CEMENT JOB

Lease PPG Well 1012 Date 11-26-84  
 Size Casing 13 3/8" Setting Depth 911 Top (liner hanger) \_\_\_\_\_  
 Hole Size 17 1/2 " Mud Gradient \_\_\_\_\_ Viscosity \_\_\_\_\_

### Casing Equipment

Guide \_\_\_\_\_ shoe, manual float located 40 feet  
 above shoe, \_\_\_\_\_ DV collars located at \_\_\_\_\_ feet  
 and \_\_\_\_\_ feet.

\_\_\_\_\_ centralizers located \_\_\_\_\_

\_\_\_\_\_ scratchers located \_\_\_\_\_

Liner hanger and pack off (describe) \_\_\_\_\_

Miscellaneous (baskets, etc.) \_\_\_\_\_

### Cement (around shoe)

	<u>No. Sacks</u>	<u>Brand</u>	<u>Type</u>	<u>Additives</u>	<u>Slurry Weight</u>	<u>Slurry Volume</u>
(1)	<u>750</u>	<u>HOWCO</u>	<u>Lite</u>	<u>3% CaCl 1/4#/sack Flocele</u>		
(2)	<u>200</u>	<u>Comm.</u>	<u>A</u>	<u>3% CaCl</u>		

Cement through DV Collar at \_\_\_\_\_ feet

	<u>No. Sacks</u>	<u>Brand</u>	<u>Type</u>	<u>Additives</u>	<u>Slurry Weight</u>	<u>Slurry Volume</u>
(3)						
(4)						

**Cementing Procedure (around shoe)** (cross out where necessary)

Circulated 30 minutes, pumped in 10 (cu. ft.), (barrels)  
prewash, used bottom plug (yes, no), mixed cement (1) above 27  
minutes, cement (2) above 9 minutes, top plug (yes, no) displaced with  
135 (cu. ft.), (barrels) in 27 minutes at rate of 5 BPM, CFM,  
(Bumped plug) (Did not bump plug). Final Pressure 135. Reciprocated  
pipe \_\_\_\_\_ feet while (mixing) and (displacing) cement. Displacing time 27  
minutes. Had \_\_\_\_\_ circulation (full, partial,  
none, etc.). Completed job at 00:53 a.m., p.m.

**Cementing Procedure (through DV at \_\_\_\_\_ feet)** (cross out where necessary)

Opened DV at \_\_\_\_\_ a.m., p.m., circulated \_\_\_\_\_ minutes, pumped in  
\_\_\_\_\_ (cu. ft.), (barrels) \_\_\_\_\_ prewash, mixed cement (3) above  
\_\_\_\_\_ minutes, cement (4) above \_\_\_\_\_ minutes, dropped closing plug, dis-  
placed with \_\_\_\_\_ (cu. ft.), (barrels) in \_\_\_\_\_ minutes at rate of \_\_\_\_\_  
BPM, CFM. (Bumped plug) (Did not bump plug). Final Pressure \_\_\_\_\_  
Displacing time \_\_\_\_\_ minutes. Had \_\_\_\_\_ circulation  
(full, partial, none, etc.)

**Remarks** (Third Stage Job, etc.)

Had 35 barrels cement return to surface

Marvin Wood

Foreman

## CASING OR LINER CEMENT JOB

Lease PPG Well 1012 Date 12-18-84  
 Size Casing 9 5/8" Setting Depth 5455 Top (liner hanger) \_\_\_\_\_  
 Hole Size 12 1/4 " Mud Gradient \_\_\_\_\_ Viscosity \_\_\_\_\_

### Casing Equipment

Auto fill shoe, auto fill float located 40 feet  
 above shoe, \_\_\_\_\_ DV collars located at 3634 feet  
 and \_\_\_\_\_ feet.

8 centralizers located every other joing above shoe

\_\_\_\_\_ scratchers located \_\_\_\_\_

Liner hanger and pack off (describe) \_\_\_\_\_

Miscellaneous (baskets, etc.) \_\_\_\_\_

### Cement (around shoe)

	<u>No.</u> <u>Sacks</u>	<u>Brand</u>	<u>Type</u>	<u>Additives</u>	<u>Slurry</u> <u>Weight</u>	<u>Slurry</u> <u>Volume</u>
(1)	<u>600</u>	<u>HOWCO</u>	<u>Lite</u>	<u>3% CaCl</u>	<u>13.6</u>	<u>210</u>
(2)	<u>200</u>	<u>Comm.</u>	<u>A</u>		<u>15.6</u>	<u>42</u>

Cement through DV Collar at \_\_\_\_\_ feet

	<u>No.</u> <u>Sacks</u>	<u>Brand</u>	<u>Type</u>	<u>Additives</u>	<u>Slurry</u> <u>Weight</u>	<u>Slurry</u> <u>Volume</u>
(3)	<u>800</u>	<u>HOWCO</u>	<u>Lite</u>	<u>3% CaCl</u>	<u>13.6</u>	<u>280</u>
(4)	<u>100</u>	<u>Comm.</u>	<u>A</u>	<u>3% CaCl</u>	<u>15.6</u>	<u>21</u>

**Cementing Procedure (around shoe)** (cross out where necessary)

Circulated 90 minutes, pumped in 15 (cu. ft.), (barrels)  
prewash, used bottom plug (yes, no), mixed cement (1) above 31  
minutes, cement (2) above 5 minutes, top plug (yes, no) displaced with  
404 (cu. ft.), (barrels) in 79 minutes at rate of 4 BPM, CFM,  
(Bumped plug) (Did not bump plug). Final Pressure 1,000. Reciprocated  
pipe \_\_\_\_\_ feet while (mixing) and (displacing) cement. Displacing time 79  
minutes. Had \_\_\_\_\_ circulation (full, partial,  
none, etc.). Completed job at 11:38 a.m., p.m.

**Cementing Procedure (through DV at 3634 feet)** (cross out where necessary)

Opened DV at 12:21 a.m., p.m., circulated 7 minutes, pumped in  
15 (cu. ft.), (barrels) prewash, mixed cement (3) above  
32 minutes, cement (4) above 3 minutes, dropped closing plug, dis-  
placed with 271 (cu. ft.), (barrels) in 56 minutes at rate of 5  
BPM, CFM. (Bumped plug) (Did not bump plug). Final Pressure 2,000  
Displacing time 56 minutes. Had \_\_\_\_\_ circulation  
(full, partial, none, etc.)

**Remarks** (Third Stage Job, etc.)

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Marvin Wood

Foreman



**Cementing Procedure (around shoe)** (cross out where necessary)

Circulated 30 minutes, pumped in 20 (cu. ft.), (barrels)  
prewash, used bottom plug (yes, no), mixed cement (1) above 37  
minutes, cement (2) above 7 minutes, top plug (yes, no) displaced with  
297 (cu. ft.), (barrels) in 53 minutes at rate of 3 BPM, CFM.  
(Bumped plug) (Did not bump plug). Final Pressure 2600. Reciprocated  
pipe \_\_\_\_\_ feet while (mixing) and (displacing) cement. Displacing time 53  
minutes. Had \_\_\_\_\_ circulation (full, partial,  
none, etc.). Completed job at 03:24 a.m., p.m.

**Cementing Procedure (through DV at \_\_\_\_\_ feet)** (cross out where necessary)

Opened DV at \_\_\_\_\_ a.m., p.m., circulated \_\_\_\_\_ minutes, pumped in  
\_\_\_\_\_ (cu. ft.), (barrels) \_\_\_\_\_ prewash, mixed cement (3) above  
\_\_\_\_\_ minutes, cement (4) above \_\_\_\_\_ minutes, dropped closing plug, dis-  
placed with \_\_\_\_\_ (cu. ft.), (barrels) in \_\_\_\_\_ minutes at rate of \_\_\_\_\_  
BPM, CFM. (Bumped plug) (Did not bump plug). Final Pressure \_\_\_\_\_  
Displacing time \_\_\_\_\_ minutes. Had \_\_\_\_\_ circulation  
(full, partial, none, etc.)

**Remarks** (Third Stage Job, etc.)

Circulate 50 barrels cement to surface

Marvin Wood

Foreman



STATE OF MICHIGAN  
REQUEST FOR TRANSFER OF A PERMIT

SUBMIT 4 COPIES TO: Department of Natural Resources  
Geological Survey Division  
Box 30028  
Lansing, Michigan 48909

Filing for change of ownership of well is required in accordance with ☐ Act 31, P.A. 1939 and ☒ Act 315 P.A. 1969, as amended, and Administrative Rules promulgated thereunder.

TYPE OR PRINT

PERMIT NO <b>042-841-367</b>	WELL TYPE <b>Minerals Exploration</b>
FIELD NAME	
WELL NAME AND NUMBER <b>Kalium 1012 (formerly Thomas 3-26)</b>	
WELL LOCATION <b>SE 1/4 NW 1/4 SECTION 26 T. 17N R. 9W</b>	
TOWNSHIP <b>Hersey</b>	COUNTY <b>Osceola</b>

TRANSFER OF A PERMIT FROM:

NAME(S) OF SELLING OWNER(S)

**PPG Industries, Inc.**

ADDRESS Number and Street - City or Town - State - Zip Code - Telephone

**One PPG Place Pittsburgh, PA 15272 (412) 434-2841**

All operating rights are discharged by:

Owner(s)

Representative(s)

Signature(s)

Date(s)

**PPG Industries, Inc. R.J. Samelson**

*R.J. Samelson* 9/1/88

ELIGIBILITY FOR PERMITS IS CONDITIONED UPON COMPLIANCE WITH THE STATUTES, RULES AND ORDERS OF THE DEPARTMENT OF NATURAL RESOURCES. PERMITS WILL NOT BE GRANTED TO PERSONS NOT IN COMPLIANCE.

NON-SUBMISSION AND/OR FALSIFICATION OF THIS INFORMATION MAY RESULT IN FINES AND/OR IMPRISONMENT.

TRANSFER OF A PERMIT TO:

NAME(S) OF ACQUIRING OWNER(S)

**Kalium Industries, Ltd.**

ADDRESS Number and Street - City or Town - State - Zip Code - Telephone

**11126 South 140th Avenue Hersey, MI 49639 (616) 832-3206**

(We) (I) have acquired the well under this permit and assume full responsibility for the drilling, operation, and abandonment in conformity with the law, regulations and orders.

SURETY BOND:

☐ SINGLE WELL

☐ ATTACHED

BONDING CO. \_\_\_\_\_

☐ BLANKET

☐ ON FILE

BOND NUMBER \_\_\_\_\_

All operating rights and responsibilities are assumed by

Owner(s)

Representative(s)

Signature(s)

Date(s)

**Kalium Chemicals, Donald D. Metzger**

*Donald D. Metzger*

9-19-88

FOR DEPARTMENT OF NATURAL RESOURCES USE ONLY

APPROVED

*Stephen J. Szyganski*

10/12/88

DISTRIBUTION BY DNR

☐ Lansing

☒ Acquiring Owner

☐ Selling Owner

☐ Field

JUL 20 1990

STATE OF MICHIGAN  
DEPARTMENT OF NATURAL RESOURCES  
GEOLOGICAL SURVEY DIVISION  
P.O. BOX 30026, LANSING, MICHIGAN 48909

## RECORD OF WELL DRILLING OR DEEPENING

USE APPROPRIATE BLOCKS. FOR ITEMS NOT LISTED SUBMIT ATTACHMENTS.

REQUIRED BY AUTHORITY OF:

☐ ACT 51, P.A. 1939, AS AMENDED.  
(Submit 2 copies within 30 days  
of completion.)

☒ ACT 315, P.A. 1989, AS AMENDED.  
(Submit 2 copies within 60 days  
of completion.)
NON-SUBMISSION AND/OR FALSIFICATION OF THIS INFORMATION MAY RESULT IN  
FINES AND/OR IMPRISONMENT.

PERMIT NO./DEEPENING PERMIT NO. 366-904-767		TYPE OF WELL (AND/OR COMPLETION) SOLUTION MINING	
FIELD/FACILITY NAME KALIUM/HERSEY POTASH FACILITY			
WELL NAME & NUMBER KC1 - 1041			
SURFACE LOCATION SW 1/4 of NW 1/4 of NW 1/4 Section 26 T 17N R 9W			
TOWNSHIP HERSEY		COUNTY OSCEOLA	
FOOTAGES: NORTH/SOUTH 1019 Ft. from N		EAST/WEST Line and 650 Ft. from W Line of 1/4 Sec	
SUBSURFACE LOCATION (if directionally drilled) NE 1/4 of SE 1/4 of NW 1/4 Section 26 T 17N R 9W			
TOWNSHIP HERSEY		COUNTY OSCEOLA	
DATE DRILLING BEGAN 4/19/90		DATE DRILL COMPLETED 5/21/90	
DATE WELL COMPLETED 5/23/90		FOOTAGES: NORTH/SOUTH 1400 Ft. from N	
		EAST/WEST Line and 2177 Ft. from W Line of 1/4 Sec	
TOTAL DEPTH OF WELL Driller 7950 Log 7951	FORMATION AT T.D. A-1 Evaporite	PROD. FORMATION(S) NA	FEET DRILLED - CABLE TOOLS From --- To ---
DATE OF FIRST INJECTION -----	INJECTED FORMATION A-1 Evaporite	SOLUTION FORMATION A-1 Evaporite	FEET DRILLED - ROTARY TOOLS From Surface To 7951
ELEVATIONS K.B. 1162.9   R.F. 1161.3   R.T. ft.   Grd. 1145.9			

## CASING, CASING LINERS AND CEMENTING, OPERATING STRINGS

## PERFORATIONS

SIZE	WHERE SET	CEMENT	FT. PULLED	DATE	NUMBER HOLES	INTERVAL PERFORATED	OPEN YES : NO
18-3/8"	390	Attached					
13-3/8"	920	"				NA	
9-5/8"	5260	"					
7	7898	"					

## GROSS PAY INTERVALS

## ALL OTHER OIL AND GAS SHOWS OBSERVED OR LOGGED

FORMATION	OIL OR GAS	FROM	TO	FORMATION	OIL OR GAS	DEPTH	WHERE OBSERVED (X)					
NA				A-2 Carb	Gas	7200	Sample	Odor	Pres	Mud Loss	Gas Loss	Fill Up
					(100							
					units)							

## STIMULATION BY ACID OR FRACTURING

## WATER FILL UP (F.U.) OR LOST CIRCULATION (LC.) (X)

DATE	INTERVAL TREATED	MATERIALS AND AMOUNT USED	FORMATION	F.U./LC. DEPTH	AMOUNT
	NA		Dundee	X   4100-	15-25 BBL/
				4200	
				(approx)	
				NO FLUID LOSS WHILE DRILLING, DID NOT LOSE CIRCULATION.	

## MECHANICAL LOGS. LIST EACH TYPE RUN

## DEPTH CORRECTION DEVIATION SURVEY PLUGGED BACK

BRAND	(X)	LOG TYPES	LOGGED INTERVALS	DEPTH	CORRECTION	RUN AT	DEGREES	YES	NO	DEPTH
Schlumberger	X	LDT/CNL/GR	100-7948							
Birwell										
Halliburton	X	GR/CAL/B.H.V.	914-5253							

## PRODUCTION TEST DATA

OIL - Bbls/day	GRAVITY - °API	COND. Bbls/day	GAS - MCF/day	WATER - Bbls/day	H <sub>2</sub> S - Grains/100 cu. ft.	S.H.P. AND DEPTH
NA	NA	NA	NA	NA	NA	NA

I AM RESPONSIBLE FOR THIS REPORT. THE INFORMATION IS COMPLETE AND CORRECT.

DATE	NAME AND TITLE (PRINT)	SIGNATURE
7/18/90	Bruce C. Fuller, Geologist	B. C. Fuller

NOTICE: REPORT COMPLETE SAMPLE AND FORMATION RECORD. LOGGING RECORD. NO DRILL ITEM TEST. (SEE INSTRUCTIONS FOR TESTS)

KCL - 1041

Casing and Cementing

1. 18-5/8", 87#, K-55 set at 390 ft.; cemented with 250 sxs. Lite w/ 3% CaCl and 50 sxs. class A with 3% CaCl; returns to surface.
2. 13-3/8", 61#, J-55 set at 920 ft.; cemented with 550 sxs. Lite w/ 3% CaCl and 200 sxs. class A with 3% CaCl; returns to surface.
3. 9-5/8", 40#, N-80 set @ 5260 ft.; cemented with 1900 sxs. Halco Light, 2% CaCl, 300 sxs. class A with 2% CaCl; cemented in 2 stages w/ returns to surface.
4. 7", 25 jts., 29#, MN-80, and 160 jts., 26#, L-80 set @7898; cemented with 960 sxs. 50/50 POZ, 2% salt sat. gel, 150 sxs. class A, 5% KCl; 1% Halad 322 plus 5#/bbl. Halco gel; returns to surface.



DATE: 4-23-90

FIG: Beard #14

920'      300

STATUS: Writing on out.

Depth	Footing Cnt
0	1
1	1
2	1
3	1
4	1
5	1
6	1
7	1
8	1
9	1
10	1
11	1
12	1
13	1
14	1
15	1
16	1
17	1
18	1
19	1
20	1
21	1
22	1
23	1
24	1
25	1
26	1
27	1
28	1
29	1
30	1
31	1
32	1
33	1
34	1
35	1
36	1
37	1
38	1
39	1
40	1
41	1
42	1
43	1
44	1
45	1
46	1
47	1
48	1
49	1
50	1
51	1
52	1
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54	1
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56	1
57	1
58	1
59	1
60	1
61	1
62	1
63	1
64	1
65	1
66	1
67	1
68	1
69	1
70	1
71	1
72	1
73	1
74	1
75	1
76	1
77	1
78	1
79	1
80	1
81	1
82	1
83	1
84	1
85	1
86	1
87	1
88	1
89	1
90	1
91	1
92	1
93	1
94	1
95	1
96	1
97	1
98	1
99	1

DAYS: 4 Shale

13 3/8      920

Report Day No.

## Formulas

Blue & Green Leaf Cane

## HOURLY BREAKDOWN

五

1	Trip to bottom	"CASING SUMMARY"	
4 1/2	Dble	Run 21 jts	13 3/8" 61#
1 1/2	Circ & mix mud	155 csg totaling	
8 1/2	Dble	925.45' set @ 920'	
1	Circ.	cont'd w/ 550 sk bits	
1	Trip (wiper)	w/ 370 CACI & 200 sk	
1	Circ.	plus A 370 CACI;	
1	TDH	32 dbl. cont. returns	
5 1/2	Run 13 3/8" csg & cont.	to pit; plug du. diam.	
3	W.O.C.	4-23-90; float held	
"DRILLING ASSEMBLY"			
M.D.	Drill L	Direction	T.V.D.
			V. Sec
			N or S
			E or W
NO. Jts. Lft. 5			
Footage Lft. 218.85			

BIT RUNS: Ser #1477142 ( ) MUD PROP ADDITIONS

Run Number	2				Depth	920	Bar.
Size-Make	17 1/2	500			Wt.	9.4	F.W. Gel
Type	5355				Via.	44	Salt Gel.
Nozzles 1/32"	20	20	20		PV	7	Slurich
Depth Out	920				YP	48	Nitrato
Footage	300'				Gels.	17/24	H <sub>2</sub> O Scav.
Hours	9				WL	N/C	LCM
Condition 1/8 Gauge	2	1	1/4		Solids	8	Sod & Ash
BH WL	30.000				Ph	12.5	Bones
RPM	80				CL	200	FLOC
PST-GPM-AV					Calcium	380	Polymer
					Nitrates		Lime

WELL COST

DAILY 36.19.00

## 1. MUD

## 2. BITS

3

4

57

25

7

8

Dr.

10.

TOTAL WELL: 105,931.00

FORM TOPS - MD TVD (-)

OFFICE USE ONLY



DATE: 5/13/90

FIG: Biasd #14

STATUS: Grilling out P.V. towel

DAYS: 24 Black Lime 95/8 5260  
Record Day No. Forming Size & Depth Last Cag

## HOURLY BREAKDOWN

15

[illegible]

BIT RUNS:		Ser # ( )		( )		MUD PROP		ADDITIONS	
Run Number	9				Depth		Bar.		
Size-Make	8 1/2 Acc.				Wt.		F.W. Gel		
Type	M 89TF				Vis.		Sak Gel.		
Nozzles 1/32"	16	16	16			PV	Starch		
Depth Out					YP		Nitrate		
Footage	- 0 -				Gels.		H <sub>2</sub> O Scav.		
Hours	- 0 -				WL		LCM		
Condition 18 Gauge						Solids	Soda Ash		
Bd Wt					Ph		Bones		
RPM					CL		FLOC		
PSI-GPM-AV						Calcium	Polymer		
					Nitrates		Lime		

WELL COST	
DAILY	134,610
1. MUD	
2. BITS	
3.	
4.	
5.	
6.	
7.	
8.	
9.	
10.	
TOTAL WELL:	506,588

FOAM TOPS - NO TVD (-)

OFFICE USE ONLY



# DAILY DRILLING REPORT

DATE: 5-24-90

WELL NAME: Kolimon #1041 RIG: Big Red #14  
7950 0' STATUS: Rig Released  
 DAYS: 35 A-1 Salt 7' 7912'  
Report Day No. Formation Size & Depth Last Log

HOURLY BREAKDOWN

SURVE

7 1/2	Run casing & log same	<div>'CASING SUMMARY'</div> <div>Run 25 Jts. 24"</div> <div>L-80 7" Csg. and</div> <div>160 Jts. 24" L-80 Csg.</div> <div>7928' set @ 7912'</div> <div>Cement with 960</div> <div>Oil. 50/50 pop.</div> <div>2% salt saturated gel</div> <div>150 ex. Clean A. 5%</div> <div>KCL; 1% Haled 322</div> <div>plus 5 lb. per bbl.</div> <div>Haled gel</div> <div>Plug down 3:30 pm</div> <div>plus 5 bbls. to pit</div> <div>NO. Jts. Lft. 29</div> <div>Footage Lft. 1229'</div>
1 1/2	Cement	
15	nipple down & set slips	
	clean pits	
</		

BIT RUNS:				MUD PROP		ADDITIONS		WELL COST	
Run Number				Depth				DAILY	24,560
Size-Make				WL		F.W. Gel		1. MUD	
Type				Via		Salt Gel		2. BITS	
Nozzles 1/32"				PV		Starch		3.	
Depth Out				YP		Nirate		4.	
Footage				Gels		H <sub>2</sub> O Scav.		5.	
Hours				WL		LCM		6.	
Condition 18 Gauge				Solids		Sod <sup>o</sup> Ash		7.	
Br. Wt.				Ph		Bones		8.	
APM				CL		FLCC		9.	
PSI-GPM-AV				Calcium		Polymer		10.	
				Nitric		Lime		TOTAL WELL:	66,900

FORM TOPS - MD TVD (-)

OFFICE USE ONLY

Attachment I.1.A.

## LITHOLOGY AND STRATIGRAPHY

Kalium 1041

(Drill depths referenced to Schlumberger LDT/CNL/GR log;  
Log measured from KB, 17.0 feet above ground level)

GL ELEV. 1145.9

KB ELEV. 1162.9

Rock Unit	Age	Drill Depth	True Vert. Depth	True Thick- ness	Lithology
Glacial Drift	Pleistocene	0	0	640	Sand, gravel, clay
Red Beds	Jurassic	640	640	90	Shale, siltstone, gyp.
Grand River	Pennsylvanian	730	730	177	Sandstone, shale
Saginaw	Pennsylvanian	907	907	265	Shale, sandstone
Bayport	Mississippian	1172	1172	67	Limestone, sandstone
Michigan	Mississippian	1239	1239	145	Shale, sandstone
Triple Gyp.	Mississippian	1384	1384	70	Anhydrite, shale
Brown Lime	Mississippian	1454	1454	117	Dolomite, shale
Stray Sand	Mississippian	1572	1571	141	Sandstone
Marshall	Mississippian	1716	1712	127	Sandstone, shale
Coldwater	Mississippian	1847	1839	739	Shale
Sunbury	Miss/Dev.	2628	2578	93	Shale
Ellsworth	Devonian	2727	2671	410	Shale
Antrim	Devonian	3155	3081	170	Shale
Traverse Fm.	Devonian	3331	3251	45	Shale, limestone
Traverse Lm.	Devonian	3378	3296	528	Limestone
Bell Shale	Devonian	3935	3824	56	Shale
Dundee	Devonian	3993	3880	70	Limestone, dolomite
Reed City Anhyd.	Devonian	4066	3950	7	Anhydrite
Reed City Dol.	Devonian	4074	3957	159	Dolomite
Det. Rv. Anhyd.	Devonian	4240	4116	69	Anhydrite
Det. Rv. Salt	Devonian	4312	4185	404	Salt, dolomite
Sour Zone	Devonian	4732	4589	130	Dolomite
Massive Anhyd.	Devonian	4867	4719	307	Anhydrite
Amherstberg	Devonian	5186	5026	113	Limestone
Sylvania	Devonian	5304	5139	112	Sandstone, limestone
Bois Blanc	Devonian	5421	5251	164	Limestone, dolomite
Bass Islands	Silurian	5593	5415	292	Dolomite
Salina G	Silurian	5900	5707	9	Dolomite, shale
F Unit	Silurian	5909	5716	43	Dolomite
F Salt	Silurian	5954	5759	561	Salt, shale, dolomite
E Unit	Silurian	6534	6320	120	Shale, dolomite
D Salt	Silurian	6656	6440	40	Salt
C Shale	Silurian	6697	6480	92	Shale, dolomite
B Salt	Silurian	6790	6572	377	Salt, dolomite

PAGE ONE



Rock Unit	Age	Drill Depth	True Vert. Depth	True Thick- ness	Lithology
A-2 Carb	Silurian	7172	6949	141	Limestone, dolomite
A-2 Salt	Silurian	7314	7090	357	Salt
A-1 Carb	Silurian	7673	7447	55	Limestone, dolomite
A-1 Salt	Silurian	7728	7502	---	Salt

PAGE TWO

TOTAL DRILL DEPTH: 7950 FT. (A-1 SALT)



3. Original bottom hole pressure
4. Static water level of drinking water aquifer
5. Porosity
6. Specific gravity of fluid in injection zone

Checklist items A.1, A.2, A.3, A.5 and A.6 pertain to characteristics of the waste brine disposal zone. Solution mining of potash dissolves a cavity in a soluble but impermeable zone as discussed in Attachment N. No disposal is to be conducted in the solution mining wells covered by this UIC permit application.

Item A.4 is the static water level of the drinking water aquifer. A static water level of 58 feet below surface was reported in the 180-foot deep water supply well drilled into the glacial drift near the Thomas 2-26 well which is intended to be utilized for test facility potash solution mining.

## ATTACHMENT B

### MAPS OF WELLS/AREA OF REVIEW

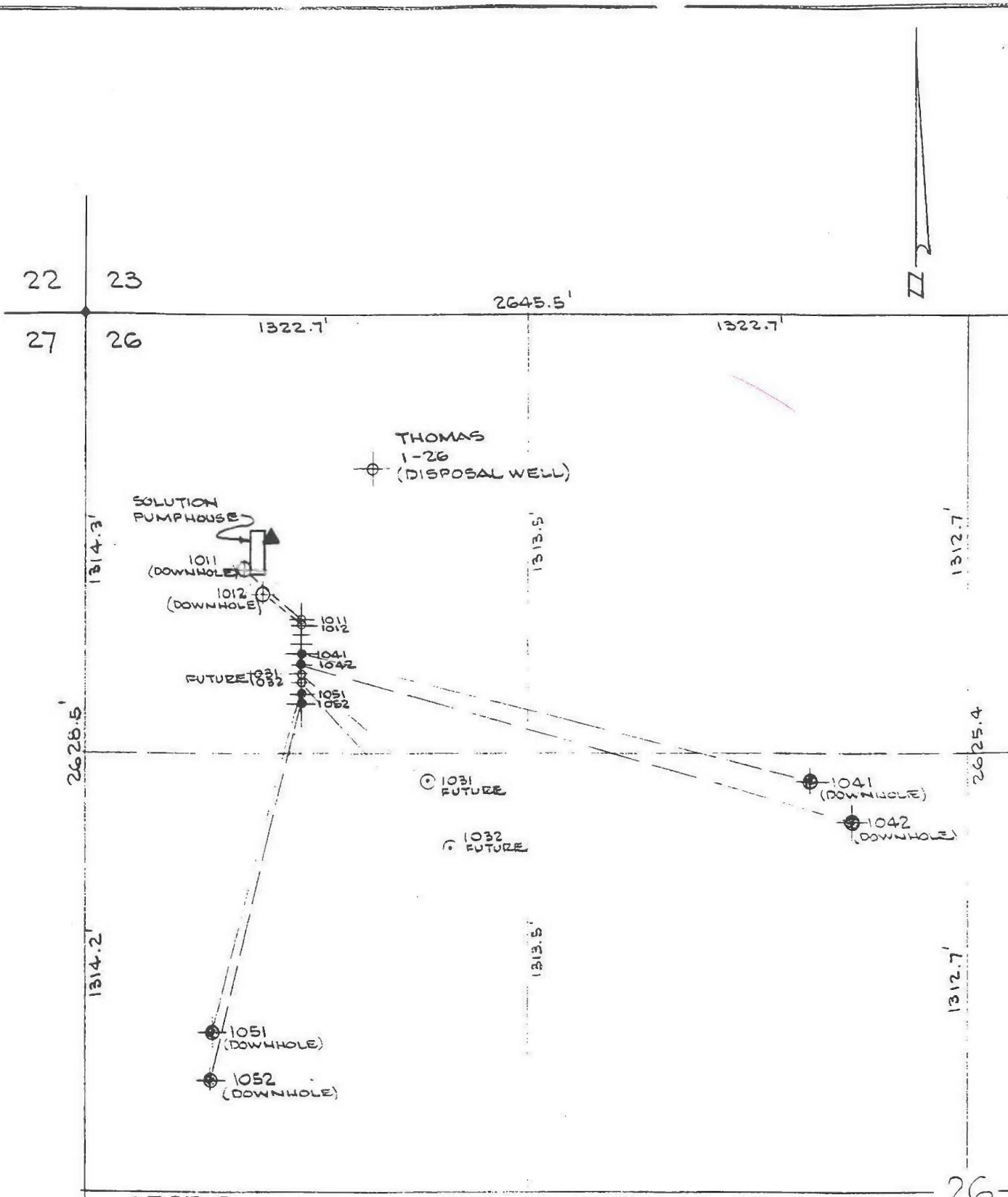
Reference: SOLUTION MINING PERMIT APPLICATION  
U. S. POTASH SOLUTION MINING TEST FACILITY  
Osceola County, Michigan, Volume I, Attachments A-D,  
for PPG Industries, Inc., Pittsburgh, Pennsylvania,  
by Fenix & Scisson, Inc., Tulsa, Oklahoma, Job#435,  
January, 1985  
Permit No. MIA-133-3G-0001

#### EPA Checklist Items:

- B. 1. Producing wells
- B. 2. Abandoned wells and dry holes
- B. 3. Water wells
- B. 4. Road, residences, lakes, mines, quarries
- B. 5. Faults
- B. 6. Public water systems and other pertinent information,  
all from public records

The attached Figures B-1, B-2 and B-3 show the additional solution mining and potable water wells that have been drilled within the proposed new permit area. All other checklist items within the permit area remain unchanged from the January, 1985 application.





**LEGEND**

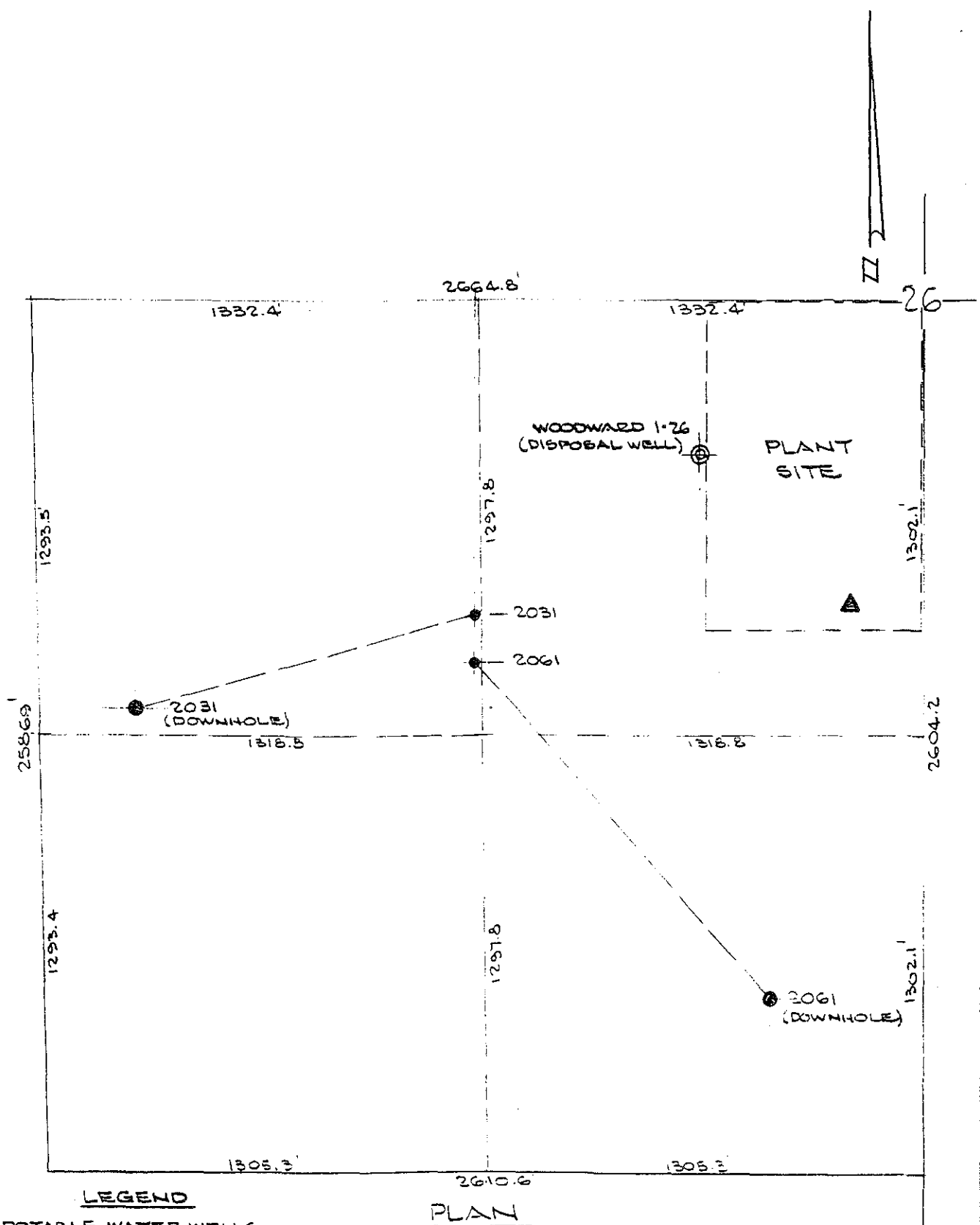
- ▲ POTABLE WATER WELLS DRILLED SINCE JAN. '85
- BEDROCK WELLS DRILLED SINCE JAN. '85
- BEDROCK WELLS DRILLED PRIOR TO JAN. '85

**PLAN**

SCALE: 1" = 400'

**FIGURE B-2**

NEW POTABLE WATER & SOLUTION MINING WELLS AT CLUSTER #1



- LEGEND**
- ▲ POTABLE WATER WELLS  
DRILLED SINCE JAN. '85
  - BEDROCK WELLS DRILLED  
SINCE JAN. '85
  - BEDROCK WELLS DRILLED  
PRIOR TO JAN. '85

**PLAN**  
SCALE: 1" = 400'

**FIGURE: B-3**  
NEW POTABLE WATER AND SOLUTION  
MINING WELLS AT CLUSTER #2



## ATTACHMENT C

### CORRECTIVE ACTION PLAN AND WELL DATA

Reference: SOLUTION MINING PERMIT APPLICATION  
U. S. POTASH SOLUTION MINING TEST FACILITY,  
Osceola County, Michigan, Volume I, Attachments A-  
D, For PPG Industries, Inc., Pittsburgh,  
Pennsylvania, by Fenix & Scisson, Tulsa,  
Oklahoma, Job #435, January, 1985  
Permit No. MIA-133-3G-0001

#### EPA Checklist Items:

- C. 1. Corrective action plan for unplugged wells which penetrate injection zone.

Well records for all known wells drilled into bedrock within the large area of review outlined on Figure A-1 have been examined in detail. No improperly sealed, completed or abandoned wells which might transmit solution mining fluids into underground sources of drinking water were found. Therefore, no specific corrective actions appear to be necessary at this time.

In the unlikely event that some unforeseen well failure which might jeopardize the underground sources of drinking water were to occur during test facility solution mining operations, the following corrective action procedure would be followed:

- 1) Immediately halt solution mining activity in the area.
  - 2) Notify the appropriate EPA and Michigan Department of Natural Resources personnel of the discovery of the well failure problem. (Telephone notification to occur within 24 hours of discovery of the problem, and written confirmation to be transmitted by letter within five days.)
  - 3) Conduct an investigation of the well failure problem and develop a plan of corrective action to eliminate the problem.
  - 4) Perform the necessary remedial work.
- C. 2. Tabulation of all wells penetrating zone with:
- a. well construction data
  - b. operator
  - c. cementing data

- d. distance
- e. date drilled
- f. depth
- g. plugging records

Table C-1 presents a tabulation of new bedrock wells drilled within the proposed permit area since the January, 1985 UIC application. Individual well completion reports are also attached.

- C. 3. Overall effect on the hydraulic gradient in potentially affected USDW's:
  - a. Corresponding changes in potentiometric surfaces and flow directions
  - b. Monitoring system designed to detect (a).

The injection of water for solution mining of potash in the A-1 Evaporite will occur at a level several thousand feet below the glacial drift fresh water zone, so this injection per se' will have no effect on the potentiometric surface of the ground water.

The potentiometric surface of the fresh ground water will be affected by pumping water from shallow wells to supply leaching water for the solution mining. A hydrogeologic investigation was conducted to predict the impact that large commercial scale solution mining would have on the local ground water resources. This investigation projects, and subsequent operating data confirm, that no significant aquifer drawdown occurs. The results of this study were presented as Appendix VI to the Applicants Environmental Report, U. S. Potash Project, PPG Industries, Inc., Pittsburgh, Pennsylvania, July 1984. A copy was attached to the 1985 UIC Application.

TABLE C-1: Bed Rock Well Statistics

Cavity	Township	Section	Oil & Gas Permit No.	Mineral Well Permit No.	Operator or Company	Well Name and Number	Total Depth (feet)	Deepest Formation Penetrated	Type of Well	Date Drilled	Current Status
Osceola	Hersey, T17N,R9W	26	-	048-841-367	Kalium Chemicals	1042	8116	Niagaran	Solution Mining	02/26/85	Active
Osceola	Hersey, T17N,R9W	26	-	016-851-367	Kalium Chemicals	1051	7892	A-1 Evaporite	Solution Mining	05/25/85	Active
Osceola	Hersey, T17N,R9W	26	-	010-851-367	Kalium Chemicals	1052	8052	A-1 Evaporite	Solution Mining	03/27/85	Active
Osceola	Hersey, T17N,R9W	26	-	366-904-767	Kalium Chemicals	1041	7950	A-1 Evaporite	Solution Mining	05/24/90	Active
Osceola	Hersey, T17N,R9W	26	-	006-851-367	Kalium Chemicals	2031	8010	A-1 Evaporite	Solution Mining	03/27/85	Shut in
Osceola	Hersey, T17N,R9W	26	-	005-851-367	Kalium Chemicals	2061	8066	A-1 Evaporite	Solution Mining	05/30/85	Shut in

Note: 1. Total depth is measured depth from rig floor. Wells are directionally drilled, therefore true vertical depth will be less than measured depth.  
2. Shut in wells were cased but have not yet been prepared for operation.

STATE OF MICHIGAN  
REQUEST FOR TRANSFER OF PERMIT

TYPE OR PRINT

SUBMIT 4 COPIES TO: Department of Natural Resources  
Geological Survey Division  
Box 30028  
Lansing, Michigan 48909

Filing for change of ownership of well is required in accordance with Act 31, P.A. 1939 and Act 315 P.A. 1969, as amended, and Administrative Rules promulgated thereunder.

PERMIT NO <b>041-841-367</b>	WELL TYPE <b>Minerals Exploration</b>
FIELD NAME	
WELL NAME AND NUMBER <b>Kalium 1011 (formerly Thomas 2-26)</b>	
WELL LOCATION <b>SE 1/4 NW 1/4 NW 1/4 SECTION 26 T17N R 9W</b>	
TOWNSHIP <b>Hersey</b>	COUNTY <b>Osceola</b>

TRANSFER OF A PERMIT FROM:

NAME(S) OF SELLING OWNER(S)

**PPG Industries, Inc.**

ADDRESS Number and Street -- City or Town -- State -- Zip Code -- Telephone

**One PPG Place Pittsburgh, PA 15272**

**(412) 434-2841**

All operating rights are discharged by:

Owner(s)

Representative(s)

**PPG Industries, Inc. R.J. Samelson**

Signature(s)

Date(s)

*R.J. Samelson 9/6/88*

ELIGIBILITY FOR PERMITS IS CONDITIONED UPON COMPLIANCE WITH THE STATUTES, RULES AND ORDERS OF THE DEPARTMENT OF NATURAL RESOURCES. PERMITS WILL NOT BE GRANTED TO PERSONS NOT IN COMPLIANCE.

NON-SUBMISSION AND/OR FALSIFICATION OF THIS INFORMATION MAY RESULT IN FINES AND/OR IMPRISONMENT.

TRANSFER OF A PERMIT TO:

NAME(S) OF ACQUIRING OWNER(S)

**Kalium Chemicals, Ltd.**

ADDRESS Number and Street -- City or Town -- State -- Zip Code -- Telephone

**11126 South 140th Avenue, Hersey, MI 49639**

**(616) 832-3206**

(We) (I) have acquired the well under this permit and assume full responsibility for the drilling, operation, and abandonment in conformity with the law, regulations and orders.

SURETY BOND:

☐ SINGLE WELL  
☐ BLANKET

☐ ATTACHED  
☐ ON FILE

BONDING CO. \_\_\_\_\_

BOND NUMBER \_\_\_\_\_

All operating rights and responsibilities are assumed by

Owner(s)

Representative(s)

Signature(s)

Date(s)

**Kalium Chemicals, Donald D. Metzger**

*Donald D. Metzger*

**9-19-88**

FOR DEPARTMENT OF NATURAL RESOURCES USE ONLY

DISTRIBUTION BY DNR

☐ Lansing  
☒ Acquiring Owner  
☐ Selling Owner  
☐ Field

APPROVED

*Stephen J. Lyndbank*

**10/17/88**

STATE OF MICHIGAN  
REQUEST FOR TRANSFER OF A PERMIT

SUBMIT 4 COPIES TO: Department of Natural Resources  
Geological Survey Division  
Box 30028  
Lansing, Michigan 48909

Filing for change of ownership of well is required in accordance with ☐ Act 61, P.A. 1939 and ☒ Act 315 P.A. 1969, as amended, and Administrative Rules promulgated thereunder.

TYPE OR PRINT

PERMIT NO <b>348-845-767</b>	WELL TYPE <b>Solution Mining</b>
FIELD NAME	
WELL NAME AND NUMBER <b>Kalium 1011 (formerly (Thomas 2-26))</b>	
WELL LOCATION <b>SE 1/4 NW 1/4 NW 1/4 SECTION 26 T 17N R 9W</b>	
TOWNSHIP <b>Hersey</b>	COUNTY <b>Osceola</b>

TRANSFER OF A PERMIT FROM:

NAME(S) OF SELLING OWNER(S)

**PPG Industries, Inc.**

ADDRESS Number and Street -- City or Town -- State -- Zip Code -- Telephone

**One PPG Place, Pittsburgh, PA 15272**

**(412) 434-2841**

All operating rights are discharged by:

Owner(s)

Representative(s)

Signature(s)

Date(s)

**PPG Industries, Inc. R.S. Samelson**

*R.S. Samelson* 9/16/88

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SURETY BOND:

☐ SINGLE WELL

☐ ATTACHED

BONDING CO. \_\_\_\_\_

☐ BLANKET

☐ ON FILE

BOND NUMBER \_\_\_\_\_

All operating rights and responsibilities are assumed by

Owner(s)

Representative(s)

Signature(s)

Date(s)

**Kalium Chemicals, Donald D. Metzger**

*Donald D. Metzger* 9-19-88

FOR DEPARTMENT OF NATURAL RESOURCES USE ONLY

APPROVED

*Stephen J. Lynch*  
Signature

10/12/88  
Date

DISTRIBUTION BY DNR

☐ Lansing

☒ Acquiring Owner

☐ Selling Owner

☐ Field

N



Monitor Wells

		Diam. (in.)	Screen Depth (ft.)
Cl. 1.	M.W.-1	2	90
	M.W.-2	2	97
	M.W.-3	2	80
	M.W.-4	4	100
	M.W.-5	4	85
	M.W.-6	4	100
	M.W.-7	4	75
	M.W.-8	4	92
	M.W.-9	4	106
Ts 1-26	M.W.-1	2	90
	M.W.-2	2	90
	M.W.-3	2	90
	M.W.-4	2	50
	M.W.-5	4	78

11-0002

TH. MW #5

-26

TER WELL)

ALT LINED  
NG PIT

HEADS

**Wilcox Associates**



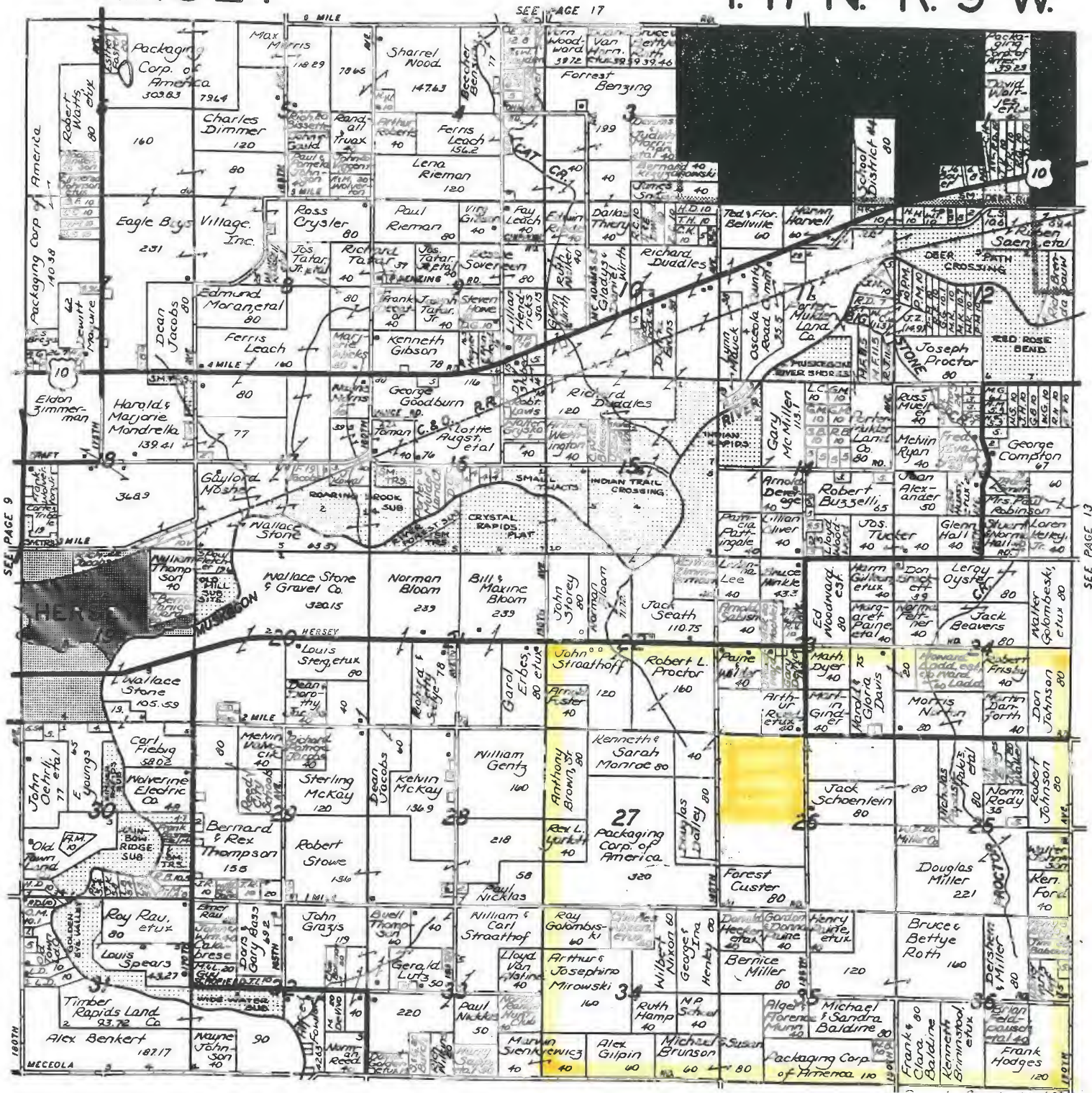
MANTON, MICH.  
(616) 824-6415

CLUSTER #1	
SECTION 26, T 17. N, R 9 W	
HERSEY TWP., OSCEOLA COUNTY, MICH.	
DATE: 9/27/89	JOB. NO. 89510



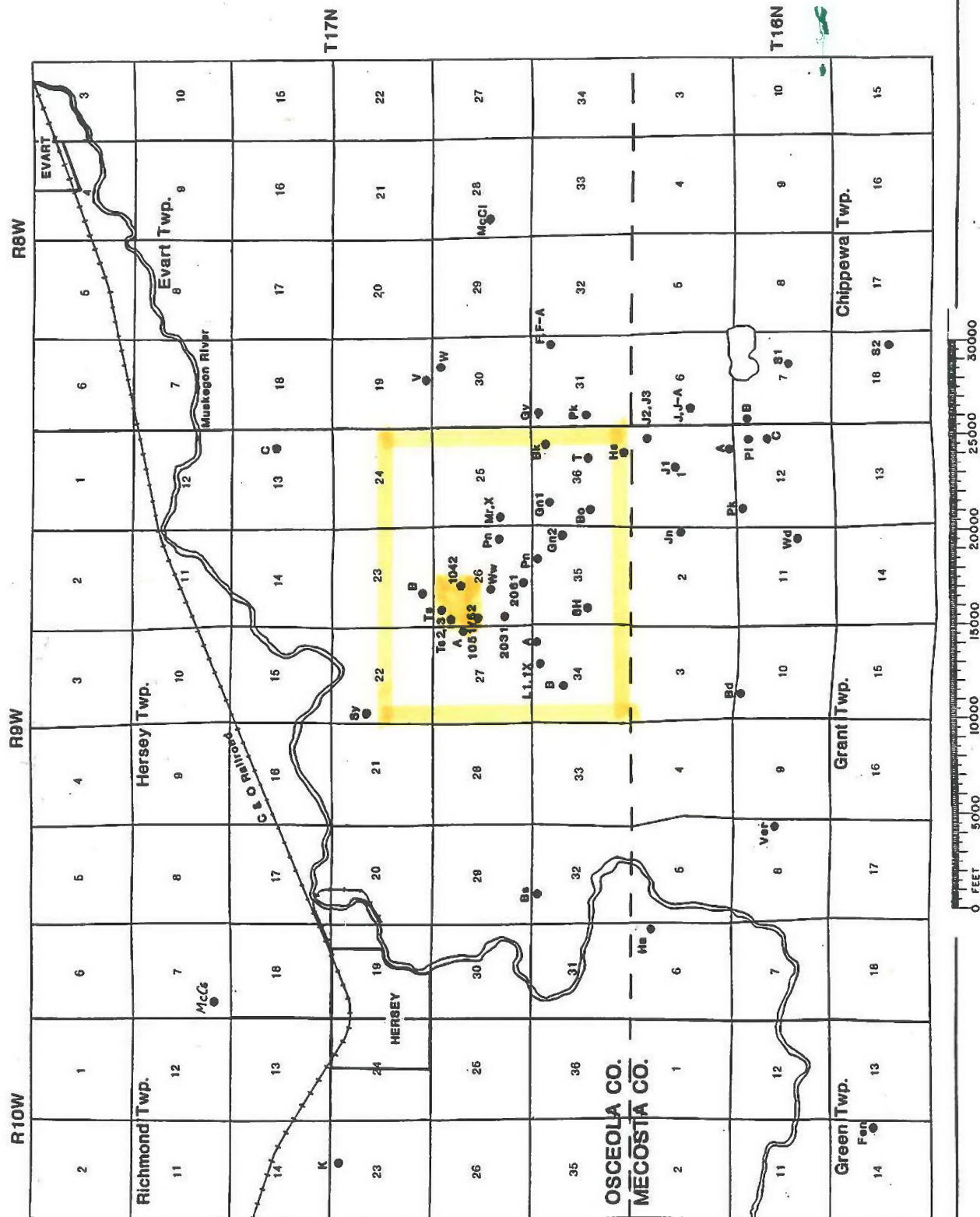
HERSEY

T. 17 N.-R. 9 W.

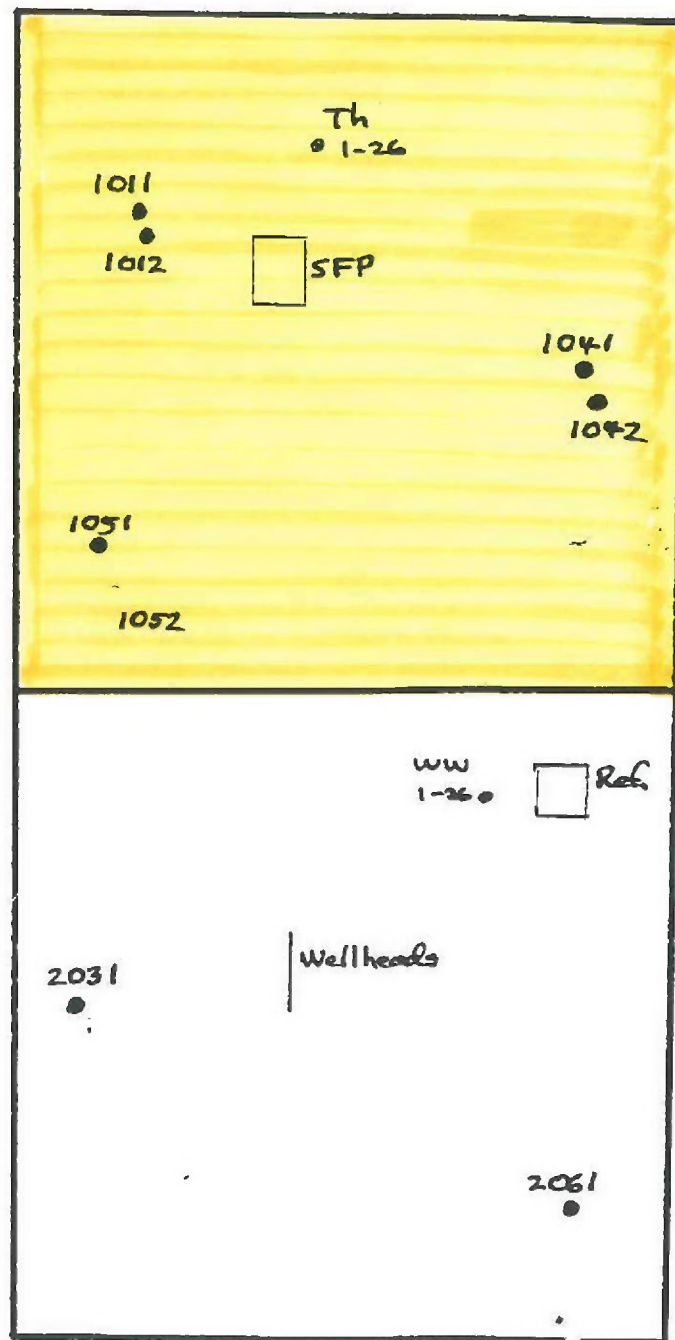




**Sund**



# LOCATION MAP



Not to scale

NAME OF OWNER OR OPERATOR OIL & GAS COMPANY		ADDRESS OF OWNER OR OPERATOR 2258 Enterprise Drive Mt. Pleasant, MI 48858	
NAME OF DRILLING CONTRACTOR INDRIL, INC.		ADDRESS OF DRILLING CONTRACTOR PO Box 668 Mt. Pleasant, MI 48858	
WELL NAME THOMAS	WELL NUMBER 2-26	PERMIT NUMBER 041-841-367	
LOCATION SE 1/4 NW 1/4 NW 1/4	SECTION 26	TWP. 17N	RANGE 9W
TOWNSHIP Horsesey		COUNTY Oscoda	
BOYAGE 914 Ft. from North Line and 650 Ft. from West Line of quarter section			
DATE DRILLING COMMENCED 10/13/84	DATE DRILLING COMPLETED 11/16/84	DATE WELL COMPLETED 11/17/84	TYPE OF WELL (Test Well)
FORMATION COMPLETED IN Niagaran	TOTAL DEPTH 7827 MD; 7811 TVD	ELEVATION KB 1162.1	AS 1160.7
STARTY TOOLS From 0 Feet to 7832 Feet	CABLE TOOLS From Feet to Feet		

WELL CASING RECORD

TUBING AND CASING DATA				CEMENTING DATA		PERFORATIONS OR OPEN HOLE		
SIZE	LB./FT.	GRADE	DEPTH	PACKS	TYPE	STAGING DEPTH(S)	NO. HOLES	FROM TO
7 7/8"	54.30	J55	903'	500 Lite, 200 CIA				
5 1/8"	40#	N80	5455'	600 Lite, 200 CIA 1st stage @ 3760'				
				800 Lite, 100 CIA 2nd stage				
	23#	S95	7582'	400 POZ, 425 HOMO A, 175 CIA				

WATER ZONES

WIRE LINE LOGS RUN

FORMATION	FROM	TO	AMOUNT	SERVICE COMPANY	TYPE LOG	INTERVAL LOGGED	COPY TO SURVEY
(Present)				Schlumberger	LDT-CNL-GR	100-7831'	
					DLL-MLL	3200-4140'	

FRACTURE OR ACID TREATMENT

SOLUTION MINING

DATE	FROM	TO	QUANTITY	NAME AND NUMBER OF INJECTION AND TARGET WELL - DISTANCE APART

The information in this report is complete and correct.

SIGNATURE William Becker	TITLE Geologist	DATE 11/29/84
-----------------------------	--------------------	------------------

GIVE COMPLETE FORMATION RECORD ON REVERSE SIDE



**Cementing Procedure (around shoe) (cross out where necessary)**

Circulated 30 minutes, pumped in 10 (cu. ft.), (barrels)  
prewash, used bottom plug (yes, no), mixed cement (1) above 31  
minutes, cement (2) above 10 minutes, top plug (yes, no) displaced with  
136 (cu. ft.), (barrels) in 35 minutes at rate of 4 BPM, CFM.  
(Bumped plug) (Did not bump plug). Final Pressure 500. Reciprocated  
pipe \_\_\_\_\_ feet while (mixing) and (displacing) cement. Displacing time \_\_\_\_\_  
minutes. Had \_\_\_\_\_ circulation (full, partial,  
none, etc.). Completed job at \_\_\_\_\_ a.m., p.m.

**Cementing Procedure (through DV at \_\_\_\_\_ feet) (cross out where necessary)**

Opened DV at \_\_\_\_\_ a.m., p.m., circulated \_\_\_\_\_ minutes, pumped in  
\_\_\_\_\_ (cu. ft.), (barrels) \_\_\_\_\_ prewash, mixed cement (3) above  
\_\_\_\_\_ minutes, cement (4) above \_\_\_\_\_ minutes, dropped closing plug, dis-  
placed with \_\_\_\_\_ (cu. ft.), (barrels) in \_\_\_\_\_ minutes at rate of \_\_\_\_\_  
BPM, CFM. (Bumped plug) (Did not bump plug). Final Pressure \_\_\_\_\_  
Displacing time \_\_\_\_\_ minutes. Had \_\_\_\_\_ circulation  
(full, partial, none, etc.)

**Remarks (Third Stage Job, etc.)**

Had 40 barrels cement return to surface, float held, plug down at 13:24, 10-16-84.  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

\_\_\_\_\_  
Marvin Wood

Foreman

## CASING OR LINER CEMENT JOB

Lease PPG Well 1011 Date 11-1-84  
 Size Casing 9 5/8" Setting Depth 5455 Top (liner hanger) \_\_\_\_\_  
 Hole Size 12 1/4" Mud Gradient \_\_\_\_\_ Viscosity \_\_\_\_\_

### Casing Equipment

Diff. fill \_\_\_\_\_ shoe, diff. fill float located 33 feet

above shoe, 1 DV collars located at 3660 feet

and \_\_\_\_\_ feet.

8 centralizers located every other joint

\_\_\_\_\_ scratchers located \_\_\_\_\_

Liner hanger and pack off (describe) \_\_\_\_\_

Miscellaneous (baskets, etc.) \_\_\_\_\_

### Cement (around shoe)

	No. Sacks	Brand	Type	Additives	Slurry Weight	Slurry Volume
(1)	<u>600</u>	<u>HOWCO</u>	<u>Lite</u>	<u>2% CaCl</u>	<u>12.4</u>	<u>210 bbls.</u>
(2)	<u>200</u>	<u>Comm.</u>	<u>A</u>		<u>15.6</u>	<u>42 bbls.</u>

Cement through DV Collar at 3660 feet

	No. Sacks	Brand	Type	Additives	Slurry Weight	Slurry Volume
(3)	<u>800</u>	<u>HOWCO</u>	<u>Lite</u>	<u>2% CaCl</u>	<u>12.4</u>	<u>280 bbls.</u>
(4)	<u>100</u>	<u>Comm.</u>	<u>A</u>	<u>2% CaCl</u>	<u>15.6</u>	<u>21 bbls.</u>



**Cementing Procedure (around shoe)** (cross out where necessary)

Circulated 60 minutes, pumped in 10 (cu. ft.), (barrels)  
prewash, used bottom plug (yes, no), mixed cement (1) above 30  
minutes, cement (2) above 6 minutes, top plug (yes, no) displaced with  
410 (cu. ft.), (barrels) in 64 minutes at rate of 64 BPM, CFM.  
(Bumped plug) (Did not bump plug). Final Pressure 1,000. Reciprocated  
pipe \_\_\_\_\_ feet while (mixing) and (displacing) cement. Displacing time 64  
minutes. Had \_\_\_\_\_ circulation (full, partial,  
none, etc.). Completed job at 17:23 a.m., p.m.

**Cementing Procedure (through DV at 3660 feet)** (cross out where necessary)

Opened DV at 17:25 a.m., p.m., circulated 2 minutes, pumped in  
10 (cu. ft.), (barrels) prewash, mixed cement (3) above  
40 minutes, cement (4) above 6 minutes, dropped closing plug, dis-  
placed with 277 (cu. ft.), (barrels) in 39 minutes at rate of 6.3  
BPM, CFM. (Bumped plug) (Did not bump plug). Final Pressure 1500  
Displacing time 39 minutes. Had \_\_\_\_\_ circulation  
(full, partial, none, etc.)

**Remarks** (Third Stage Job, etc.)

Good cement job.

Had 15 barrels return on 1st stage and 10 barrels on 2nd stage

Marvin Wood

Foreman



TABLE C-2 (REVISED)  
BEDROCK WELL STATISTICS

COUNTY	TOWNSHIP	SECTION	OIL AND GAS PERMIT NUMBER	MINERAL WELL PERMIT NUMBER	COMPANY OR OPERATOR	
OSCEOLA	HERSEY T17N, R9W	25	30341		J. O. MUTCH	DOUG
OSCEOLA	HERSEY T17N, R9W	26	28635		HARRY L. MUTCH	HENR
OSCEOLA	HERSEY T17N, R9W	26	36600	1248-831-367	KALIUM CHEMICALS, LTD.	THOM
OSCEOLA	HERSEY T17N, R9W	26		020-841-367	PPG OIL AND GAS COMPANY	THOM
OSCEOLA	HERSEY T17N, R9W	26		021-841-367	PPG OIL AND GAS COMPANY	THOM
OSCEOLA	HERSEY T17N, R9W	26		041-841-367	KALIUM CHEMICALS, LTD.	THOM
OSCEOLA	HERSEY T17N, R9W	26		042-841-367	KALIUM CHEMICALS, LTD.	THOM
OSCEOLA	HERSEY T17N, R9W	26	36942	1217-831-367	KALIUM CHEMICALS, LTD.	WOOL
OSCEOLA	HERSEY T17N, R9W	26	37317	1253-831-367	MARATHON OIL	PAINE
OSCEOLA	HERSEY T17N, R9W	26	37519	1254-831-367	MARATHON OIL	MULLI
OSCEOLA	HERSEY T17N, R9W	34		005-841-367	PPG OIL AND GAS COMPANY	LUTZ
OSCEOLA	HERSEY T17N, R9W	34		024-841-367	PPG OIL AND GAS COMPANY	LUTZ
OSCEOLA	HERSEY T17N, R9W	34		025-841-367	PPG OIL AND GAS COMPANY	LUTZ
OSCEOLA	HERSEY T17N, R9W	34		027-841-367	PPG OIL AND GAS COMPANY	LUTZ
OSCEOLA	HERSEY T17N, R9W	35	28786		HERSEY OIL AND GAS COMPANY	DONA
OSCEOLA	HERSEY T17N, R9W	35	28888		J. O. MUTCH	RAND
OSCEOLA	HERSEY T17N, R9W	35	36186	1409-821-367	MARATHON OIL	PAINE
OSCEOLA	HERSEY T17N, R9W	35	36355	1446-82-367	WILLMET, INC.	STATI
OSCEOLA	HERSEY T17N, R9W	36	28498		HERSEY OIL AND GAS COMPANY	DONA
OSCEOLA	HERSEY T17N, R9W	36	28710		HARRY L. MUTCH	THOM
OSCEOLA	HERSEY T17N, R9W	36	36033	1384-821-367	MARATHON OIL	GREIN
OSCEOLA	HERSEY T17N, R9W	36	36925	1213-831-367	MARATHON OIL	BALDI
OSCEOLA	HERSEY T17N, R9W	35	38748		MARATHON OIL	GREIN
OSCEOLA	HERSEY T17N, R9W	26		048-841-367	KALIUM CHEMICALS, LTD.	KCI 10
OSCEOLA	HERSEY T17N, R9W	26		016-851-367	KALIUM CHEMICALS, LTD.	KCI 10
OSCEOLA	HERSEY T17N, R9W	26		010-851-367	KALIUM CHEMICALS, LTD.	KCI 10
OSCEOLA	HERSEY T17N, R9W	26		366-904-767	KALIUM CHEMICALS, LTD.	KCI 10
OSCEOLA	HERSEY T17N, R9W	26		006-851-367	KALIUM CHEMICALS, LTD.	KCI 20
OSCEOLA	HERSEY T17N, R9W	26		005-851-367	KALIUM CHEMICALS, LTD.	KCI 20

NOTE: 1. TOTAL DEPTH IS MEASURED DEPTH FROM RIG FLOOR. SOME WELLS ARE DIRECTIONALLY DRILLED. TI

2. "ON HOLD" WELLS WERE CASED BUT HAVE NOT YET BEEN PREPARED FOR OPERATION.

3. TABLE C-1 WAS REVISED ON NOVEMBER 12/91 TO INCLUDE INFORMATION ON WELLS DRILLED PRIOR TO

Note 1

This is an application for a Class III solution Mining Area Permit. Within this area there are wells currently being operated under an existing UIC permit, MIA-133-3G-0001, wells that will be converted for solution mining operation and proposed wells to be drilled in the future.

Note 2

Two existing wells within area to be converted for solution mining operation by the end of 1992.

Up to three new wells to be drilled within area for solution mining operation by the end of 1992.

SOLUTION MINING PERMIT APPLICATION

FOR

U. S. POTASH PROJECT  
OSCEOLA COUNTY, MICHIGAN  
CLASS III AREA PERMIT

ATTACHMENTS A - U

FOR

KALIUM CHEMICALS, LTD.  
HERSEY, MICHIGAN

October 18, 1991

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## INTRODUCTION

PPG Industries, Inc. (PPG) discovered significant potash-bearing deposits in an area spanning the border between Mecosta and Osceola Counties in Michigan. The potash mineralization occurs within the A-1 Evaporite of the Salina Group of formations which lie 7500 to 7800 feet below surface.

PPG constructed and operated a solution mining test facility in 1985 and 1986 to confirm the workability of solution mining techniques and to demonstrate the feasibility of injecting disposal brine into a suitable porous and permeable subsurface rock formation. Potash minerals were not extracted from the brine produced during the test facility operation. PPG operated this facility under UIC Class I Disposal Well permits MI-133-1I-0001, MI-133-1I-0002 and MI-133-1I-0003, and Class III Solution Mining Well area permit MIA-133-3G-0001. Results from the test facility were encouraging, however, a downturn in the Potash industry forced PPG to terminate testwork in July 1986 and delay expenditures on a commercial production facility.

In November, 1987 PPG sold all of its Potash interests, including the Michigan project, to Sullivan and Proops (S & P) of Chicago. The EPA operating permits were transferred to Kalium Chemicals, Ltd. (Kalium), a fully owned subsidiary of S & P.

In 1989 Kalium constructed a small commercial production facility to process the potash brines produced from the solution mining wells. The location of this facility is shown in Figure 1. The facility remains in operation today and plans are currently being formulated to expand mining beyond the borders of the current UIC permit area.

This report is part of the application for a new UIC Class III area permit to include an expanded mining area and to clarify and modify certain aspects of the current permit. Instructions for UIC Form 4, EPA's Underground Injection Control Permit Application, call for submittal of comprehensive project supporting data in the form of a series of attachments designated A through U. Most of the information presented in the original permit application prepared by PPG is still valid and will not be resubmitted with this application. References to information in the original application have been made where appropriate.

The disposal wells permitted in 1985 continue to provide adequate brine disposal capacity, therefore no revisions to the UIC Class I permits are being requested at this time.

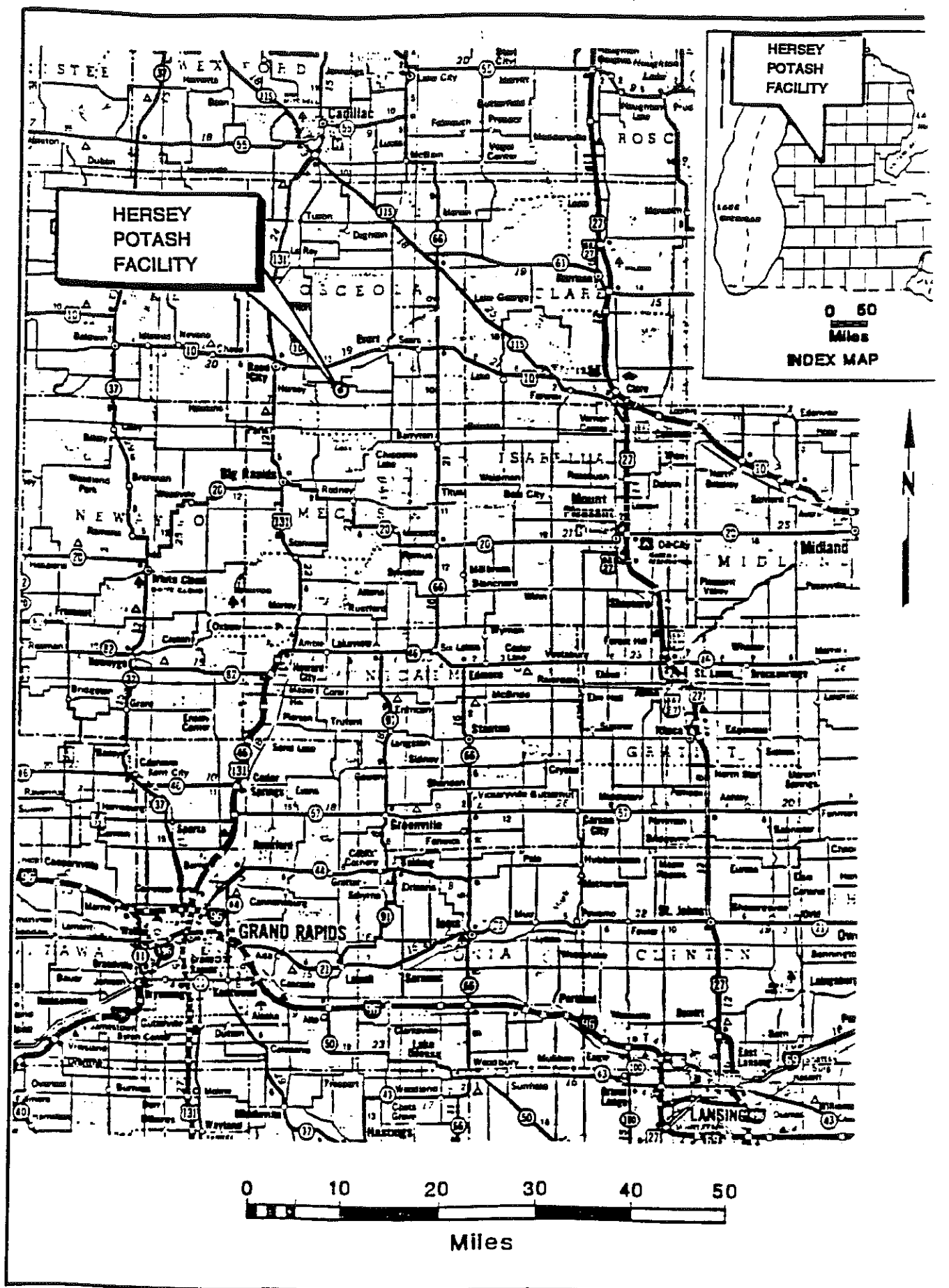


Figure 1. Location Map

**WW ENGINEERING & SCIENCE  
ENVIRONMENTAL LABORATORY DIVISION**

CLIENT: KALIAM CHEMICALS  
PROJECT NO.: 27497  
LOCATION: SOLUTION FEED PLANT  
SAMPLED BY:  
DESCRIPTION: MONTHLY MONITORING

DATE SAMPLED: 00/00/00 TIME:  
DATE RECEIVED: 08/08/91 TIME: 12:30 PM  
DATE COMPLETED: 08/26/91  
SCHEDULED COMPLETION: 08/26/91  
ANALYST: MRJ, AMF, GEP, JW  
QUALITY CONTROL REVIEW BY: CS, BJD  
WORKSHEET NO: 10

					DETECTION LIMIT	UNITS
	1051 RETURN	1011 RETURN	1042 RETURN	RECYCLE INJECTION		
LAB SAMPLE NO:	70679	70680	70681	70682		
ALKALINITY, TOTAL	58	90	134	65	2.0	mg/l CaCO <sub>3</sub>
CONDUCTIVITY @ 25 C	637,200	645,700	560,100	631,500	5	umhos/cm
CHLORIDE, TOTAL	205,000	168,000	202,000	199,000	2.0	mg/l
pH VALUE	6.13	6.72	6.84	7.22	---	std. units
RESIDUE, DISSOLVED	377,000	364,000	306,000	308,000	1	mg/l
SPECIFIC GRAVITY	1.2308	1.2282	1.2060	1.2268	60	deg F.
SULFATE	1,560	1,410	1,040	1,610	5.0	mg/l
SULFIDE, TOTAL	22	23	2.8	12	1.0	mg/l





Analytical Laboratories

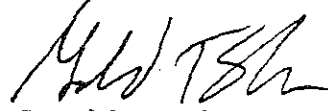
ANALYTICAL REPORT

CLIENT: Kalium Chemical Co.  
PROJECT: N/A  
LAB REF. NO.: 10414  
SAMPLED BY: LRC  
DESCRIPTION: Water Sample  
ANALYST: CC, JC, JS, EB, TJ  
DATE SAMPLED: 02/14/91  
DATE RECEIVED: 02/15/91  
DATE FINISHED: 03/06/91  
REPORT DATE: 03/06/91

LAB SAMPLE I.D.: 1549  
CLIENT SAMPLE I.D.: #1012 - RETURN FLUID  
LIMIT OF DETECTION

BARIUM	0.3	0.1
CALCIUM	1860	0.01
IRON	4.6	0.02
MAGNESIUM	246	0.001
SODIUM	101,400	0.002
ALKALINITY BICARBONATE		
AS mg CaCO <sub>3</sub> /L	140	10
ALKALINITY CARBONATE		
AS mg CaCO <sub>3</sub> /L	ND	10
CHLORIDE	220,000	1
SULFATE	1850	5
TOTAL SULFIDE	95	0.1
CONDUCTIVITY @ 25°C		
umhos/cm	643,800	0.01
pH @ 25°C, s.u.	7.1	0.1
TOTAL DISSOLVED SOLIDS	338,000	1
SPECIFIC GRAVITY, @ 4°C	1.214	0.001
ION BALANCE	-16	

ND = Non Detectable  
Results are in mg/L; Unless otherwise stated.

  
Gerald T. Skar  
Laboratory Director  
nef



## ANALYTICAL SERVICES

PROJECT: PPG Industries  
ASI REF. NO.: 51416  
SAMPLED BY: PPG Industries  
DESCRIPTION: Water Sample  
ANALYST: LBC, DRS, TBS, TDS, RJA

DATE SAMPLED: 3/14/86  
DATE RECEIVED: 3/18/86  
DATE FINISHED: 4/01/86  
REPORT DATE: 4/02/86

ASI SAMPLE I.D.	9000	9001
CLIENT SAMPLE I.D.	86-03-14-01	86-03-14-02
	Solution Mining	Disposal Well

BICARBONATE, mg/L	115	92
CARBONATE, mg/L	0	0
CALCIUM, mg/L	301	215
BARIUM, mg/L	<.1	<.1
CHLORIDE, mg/L	100,500	44,300
CONDUCTIVITY, umhos	16,667	87,719
TOTAL IRON, mg/L	0.09	0.50
MAGNESIUM, mg/L	119	104
pH @ 20 C, s.u.	7.4	7.8
SODIUM, mg/L	65,000	28,000
SULFATE, mg/L	1,200	950
SULFIDE, mg/L	0.8	0.2
ION BALANCE, %	4.1	1.4

AQUATIC SYSTEMS, Inc.

Robert J. Allard, Jr.  
Lab Director

## ATTACHMENT A

### AREA OF REVIEW

The EPA's Underground Injection Control regulations call for comprehensive investigations of an "area of review". The area of review for an area permit may be defined as a fixed width of not less than one-fourth (1/4) mile for the circumscribing area.

The original brine disposal feasibility study for the project included a detailed examination of a large study area defined by connecting the arcs of two mile radii circles drawn around the three permitted disposal wells. Kalium proposes to define the new solution mining permit area to include the following lands in Hersey Township, Osceola County, Michigan.

SE 1/4 of Section 22, T17N, R9W  
S 1/2 of Section 23, T17N, R9W  
E 1/2 of Section 27, T17N, R9W  
All of Section 26, T17N, R9W  
NE 1/4 of Section 34, T17N, R9W  
N 1/2 of Section 35, T17N, R9W

Kalium's current area permit consists of just one 1/4 section, specifically the NW 1/4 of Section 26, T17N, R9W.

The solution mining wells are directionally drilled from central surface locations called clusters. The new permit area will contain the currently permitted Cluster No. 1 wells plus additional wells at a new Cluster No. 2 location. Future clusters will be developed radially from Clusters 1 and 2.

Figure A-1 shows the proposed new solution mining permit area, the current solution mining permit area, and the larger study area. Figure A-1 also shows the 1/4 mile width circumscribing the permit area of this application.

Within the larger study area a thorough search was conducted to identify all wells which penetrate the bedrock and to determine the casing and plugging details and current status of each. In addition, a survey of surface and underground fresh water resources and water wells was performed by Keck Consulting Services, Inc. of Williamston, Michigan for all of the study area except for a small area on the north side of the Muskegon River. This work was completed for the 1985 UIC permit and was updated for this application.

#### EPA Checklist Items:

- A. 1. Permeability of disposal zone
2. Net thickness of disposal zone

